Y964

Surgery, Gynecology and Obstetrics

An International Journal
Published Monthly

EDITORIAL STAFF

Nicholas Senn, M. D.

John B. Murphy, M. D. — J. Clarence Webster, M. D. — C. S. Bacon, M. D.
E. Wyllys Andrews, M. D. — E. C. Dudley, M. D. — Rudolph W. Holmes, M. D.
Frederic A. Besley, M. D. — John C. Hollister, M. D. — Cecil v. Bachelle, M. D.
Wm. R. Cubbins, M. D.

Franklin H. Martin, M. D., Managing Editor
Allen B. Kanavel, M. D., Associate Editor

Volume II
January-June, 1906

PUBLISHED BY THE
SURGICAL PUBLISHING COMPANY OF CHICAGO
103 STATE STREET, CHICAGO
1906

COLLABORATORS

CHICAGO

Ex-Officio
- C. S. BACON, M. D., President Chicago Medical Society
- D. A. K. STEELE, M. D., President Chicago Surgical Society
- FRANK T. ANDREWS, M. D., President Chicago Gynecological Society

W. H. Allport, M. D.
Carl Beck, M. D.
Arthur D. Bevan, M. D.
James Burry, M. D.
Henry T. Byford, M. D.
Frank Cary, M. D.
Charles Davison, M. D.
Joseph B. De Lee, M. D.
E. J. Doering, M. D.
Frank B Earle, M. D.
Alex. H. Ferguson, M. D.
Albert Goldspohn, M. D.
A. E. Halstead, M. D.
M. L. Harris, M. D.
Wm. M. Harsha, M. D.
Fernand Henrotin, M. D.
J. C. Hoag, M. D.
Henry F. Lewis, M. D.
L. L. McArthur, M. D.
Andrew McDermid, M. D.
H. P. Newman, M. D.
A. J Ochsner, M. D.
John E. Owens, M. D.
C. E. Paddock, M. D.
S. C. Plummer, M. D.
C. B. Reed, M. D.
H. M. Richter, M. D.
E. C. Riebel, M. D.
Emil Ries. M. D.
Byron Robinson, M. D.
Wm. E. Schroeder, M. D.
E. J Senn, M. D.
Weller Van Hook, M. D.
Bertha Van Hoosen, M. D.
Lucy Waite, M. D.
T. J. Watkins, M. D.

NEW YORK

J. D. Emmett, M. D. Wm. T. Bull, M. D.
Austin Flint, Jr., M. D.

BOSTON

Maurice H. Richardson, M. D. Walter L. Burrage, M. D.
Edward Reynolds, M. D.

PHILADELPHIA

E. E. Montgomery, M. D. John B. Deaver, M. D.
Edward P. Davis, M. D.

BALTIMORE

Howard A. Kelly, M. D. J. C. Bloodgood, M. D.
J. Whitridge Williams, M. D.

SAN FRANCISCO

Beverly MacMonagle, M. D. George Goodfellow, M. D.

DENVER

W. W. Grant, M. D. Carey Fleming, M. D.

WASHINGTON

Henry D. Fry, M. D. J. Wesley Bovee, M. D.

ROCHESTER, MINN.

William J. Mayo, M. D. Charles H. Mayo, M. D.

ST. LOUIS

N. B. Carson, M. D. Walter B. Dorsett, M. D.

KANSAS CITY

A. H. Cordier, M. D. J. D. Griffith, M. D.

LOUISVILLE

Lewis S. McMurtry, M. D. Ap. Morgan Vance, M. D.

COPYRIGHT BY
THE SURGICAL PUBLISHING COMPANY
OF CHICAGO
1906

SURGERY, GYNECOLOGY AND OBSTETRICS

AN INTERNATIONAL MAGAZINE, PUBLISHED MONTHLY

VOLUME II JANUARY, 1906 NUMBER 1

COMMON-DUCT CHOLELITHIASIS: ITS SYMPTOMS, COMPLICATIONS, AND TREATMENT

BY A. W. MAYO ROBSON, D.Sc., F. R. C. S., LONDON, ENGLAND

BILIARY concretions produce an entirely different set of symptoms, complications, and dangers, according to their position in the gall-bladder, cystic or common duct; for, while gall-stones in the gall-bladder may produce little or no discomfort in the absence of infection, and may be present for years without being recognized, until the onset of catarrh or some more acute infection, or possibly not until the advent of malignant disease, yet as soon as they leave the gall-bladder and enter the cystic duct, the well-known seizures of biliary colic occur without jaundice or with a very slight icteric tinge in the conjunctivæ, due to extension of catarrh along the ducts.

According to the size of the stone in relation to the ducts, and the intensity, or otherwise, of the associated catarrh, the symptoms may present every variety, from mere evanescent spasms, usually called indigestion, to violent colic, agonizing in character and not easily mistaken for any other disease, and in which the pain may be so acute as even to lead to collapse and sudden death.

Obstruction of the cystic duct leads to another train of symptoms, in the shape of retention of inflammatory products and the development of a tumor due to distention of the gall-bladder, either with mucus if the catarrh is only moderate in intensity, or with muco-pus if the inflammation be more virulent. If the inflammatory process be very acute, phlegmonous cholecystitis, or even gangrene of the gall-bladder, may occur; and associated with this acute inflammation a local protective peritonitis nearly always develops, and leads to great augmentation of the original tumor by visceral adhesions.

Perforation of the bile-passages, general peritonitis, abscess, septicæmia, pyæmia, and other serious complications may then follow. All these symptoms, and many others, may occur without any evidence of jaundice, as they are quite compatible with a perfectly patent common bile-duct, and therefore with an absence of interference with the important excretory functions of the liver.

In rare cases a large gall-stone impacted in the cystic duct may by pressure on the common duct and on the portal vein cause both jaundice and ascites, and may thus lead to an error in diagnosis. If, in the more chronic cases, at the same time the gall-bladder is distended, the combination of symptoms will give rise to a suspicion of malignant disease, or if the gall-bladder cannot be felt and there are rigors and other signs of infective cholangitis, common-duct cholelithiasis will be suspected.

As soon, however, as a gall-stone enters the common bile-duct, an entirely different train of symptoms occurs, and serious as the other conditions I have mentioned may be, yet a greatly enhanced series of dangers arises from an interference, not only with the excretory functions of the liver, but also with the secretory and metabolic functions of the pancreas.

I will endeavor to point out, to the best of my ability, what these dangers are, how they may be recognized, and how they may be prevented, or if they have unfortunately supervened, how they may be remedied.

SYMPTOMS

Although Courvoisier estimated the presence of gall-stones in the common duct to occur only in four per cent of all cases of cholelithiasis, more recent observers universally agree that this is an underestimate, and I am confident from my own experience that in the early operations we frequently failed to discover concretions in the common duct; in fact, it is only since the adoption of the long upward incision, so as to enable the liver to be rotated or lifted up and the whole of the bile-ducts thus to be completely under observation, that it has been possible in every case to ascertain the true condition of the biliary passages. Thus I find that in forty per cent of my gall-stone cases there have been concretions in the common duct.

It may be that this is a higher proportion than is usually found, for it frequently happens that when a surgeon devotes special attention to some subject, he has a great many of the more difficult cases sent to him; but, even arguing from my experience in hospital practice, where there must of necessity be less selection, I find that my common-duct cases bore the proportion of one third to the whole of my operations.

Courvoisier, in his original observations, made another statement which needs correction, and that is with regard to the number of single stones in the common duct. He said that in two thirds of the cases only one gall-stone was found. This, again, is contrary to my experience, for I find that a single gall-stone is the exception, and that in quite eighty per cent of cases the concretions are multiple.

The special combination of symptoms pointing to common-duct cholelithiasis is a history of frequent attacks of pain, usually known as "spasms," which may have persisted off and on for years or for shorter periods, at first unaccompanied by jaundice, or at most by a mere icteric tinge in the conjunctivæ, then comes an attack in which well-marked jaundice follows within twenty-four hours of the pain. This, as a rule, heralds the passage of the stone from the cystic duct into the common duct. If the stone is small enough to pass, the jaundice may persist for a week or two, with frequent recurrences of pain, and then the patient may obtain relief, which may be lasting, or it may be that the gall-stone becomes impacted in the common duct, when the jaundice persists and the liver soon becomes enlarged. In some of these cases the pain completely disappears after the first attack, though the jaundice continues; this is the class of cases that so frequently gives rise to the suspicion of malignant disease, for the pain may have been comparatively slight, and the patient may give a history of the jaundice having come on without pain; which, when associated with rapid loss of flesh, deep jaundice, and enlargement of the liver, presents a picture that resembles one of cancer of the pancreas.

It will, however, be noticed that the jaundice is usually less intense or lighter in color in cholelithiasis than if the obstruction is dependent on cancer of the head of the pancreas, and the previous history of gall-stone attacks, as well as the history, on close questioning, of pain preceding the present seizure, will usually afford some hope that the disease is simple.

Moreover, there is another sign that should always be noted. This I pointed out for the first time in 1887, before I knew that Courvoisier had also described it. In cancer of the head of the pancreas there is usually distension of the gall-bladder, whereas in common-duct cholelithiasis the gall-bladder can be seldom felt. The condition is probably due to the following combination of causes:

(*a*) All cases of cholelithiasis producing symptoms are accompanied by inflammation of the walls of the biliary passages, as shown by the almost universal presence of adhesions around the gall-bladder.

(*b*) Gall-stones in the common duct seldom cause complete obstruction, either because they are floating in the duct or because they only partially fill it. There is therefore usually no sufficient backward pressure to cause dilatation of the gall-bladder.

(*c*) The muscular coat of the gall-bladder contracts in efforts of expulsion when there is any obstruction in the common duct.

(*d*) The contraction, from being at first intermittent, becomes, in the long run, constant, and the accompaning inflammation fixing the contracted gall-bladder, it atrophies.

But, besides these symptoms and signs, further help of an important character may be found by a careful examination of the urine, when, if the pancreas is involved, certain crystals can be found by an elaborate chemical process discovered by my friend Dr. Cammidge. If the crystals are acicular, with sharp ends, arranged in rosettes, and dissolve in from 15 to 30 or 40 seconds in dilute sulphuric acid, the possibility is that the cause of the obstruction is either an interstitial pancreatitis alone or a pancreatitis secondary to an impacted gall-stone; whereas if the crystals are thicker, with more rounded ends and take a long time, from 1 to 5 minutes, to dissolve in dilute sulphuric acid, the probability is that the disease is cancer of the pancreas. I have found this test of great value in a considerable number of cases, some of which I mentioned in my Hunterian Lectures on the Diseases of the Pancreas at the Royal College of Surgeons.

I would, however, point out that while this test is a great help, it must not be taken alone; though, in combination with other symptoms and signs, it will frequently assist one in a difficult diagnosis, which could otherwise be settled only by an exploratory operation.

If the gall-stone is impacted in the pancreatic portion of the duct, and thus obstructing the outflow of pancreatic fluid as well as the bile, we also expect certain changes in the fæces which are common to cancer of the head of the pancreas. These are characterized by the absence of bile and the presence of a large quantity of neutral fat in the motions, and if the patient has been taking meat, by the presence of muscular fibers. As an aid to diagnosis, an examination of the fæces has not received sufficient attention. It will usually be found that where the obstruction is due to gall-stones not involving the pancreas, the neutral fat and the fatty acids are equal in amount, that the fæces are alkaline and contain some bile, but that where the pancreatic duct is obstructed either by a growth of the head of the pancreas or by a gall-stone impacted in the pancreatic portion of the common duct, the neutral fat greatly predominates over the fatty acids, and that the fæces are acid in reaction; moreover, when the obstruction is due to cancer of the head of the pancreas, the bile is entirely absent from the fæces.

If the gall stone or stones are not impacted, but are floating in a dilated common duct, a very characteristic train of symptoms will occur, pointing to infective cholangitis. In this case the gall-stone acts as a ball-valve, producing intermittent obstruction, and with each attack the infected bile is forced back into the liver under pressure and becomes absorbed, giving rise to ague-like paroxysms, characterized by rigors, fever, and profuse sweating, each attack being followed by a deepening of the pre-existing jaundice and accompanied by pain, more or less intense. In nearly all these cases of floating gall-stones in the common duct there is associated catarrh of the pancreas, which can be demonstrated by the metabolic and chemical tests in the urine and fæces that I have previously mentioned. Probably this helps to account for the rapid loss of flesh that frequently attends these cases.

I have had the bile examined in a large number of cases of infective cholangitis associated with gall-stones, and I find that the usual organism present accounting for the symptoms is the bacterium coli commune, and this I have found to be the case in some instances where the condition has passed on from infective to suppurative cholangitis; a very dangerous condition, which leads to abscess of the liver and to other serious secondary complications. In two cases, however, where the symptoms were pyæmic in character, in one being associated with suppurative parotitis at the time of operation, and in another with suppurative pancreatitis in addition to the bacterium coli commune, streptococci were also found. Both these cases terminated fatally, and I suspect that wherever the bile and the pancreatic ducts are infected with streptococci, a fatal result must almost necessarily be the sequence, though one must not generalize too positively on the report of two cases.

I was very interested in reading Drs. Sargent and Dudgeon's lectures, to find in their observations that in cases of suppurative appendicitis wherever streptococci existed in the peritoneum, a fatal termination generally, if not always, resulted.

In some cases the rigors are repeated with such regularity that a suspicion of ague will arise, and it has happened to me to see several cases where malarial fever had been diagnosed under circumstances which rendered it extremely probable. The greater number of these cases occurred in men who had lived in India or in other tropical countries; and in one patient, who had been under observation in a nursing home in London, ague organisms were actually said to have been found in the blood, and as the spleen and liver were enormously enlarged and there was very little pain, the conclusions arrived at could not be wondered at. His case, however, entirely failed to yield to quinine or other similar treatment, and I was then asked to see him, and found and removed a floating gall-stone from his common duct, with the result that he is now in excellent health. In this special case, as in all the cases of this class, the urinary test showing involvment of the pancreas proved of great utility.

In several cases I have removed gall-stones from the common duct where the attacks were accompanied by rigors without any pain being complained of, and in others I have found common-duct cholelithiasis without a history of jaundice.

It has to be borne in mind that there may be a tinge of jaundice observed in the conjunctivæ, though no bile can be discovered in the urine by any of the well-known tests, and in fact it should not be forgotten that a trace of bile in the urine amounting even to five per cent may not be detected by any of the known chemical procedures.

A well-known surgeon recently said that in fully one third of his cases of common-duct stone there was no jaundice. This must, I think, have been an error in observation, for I have now operated on nearly 150 cases of common-duct cholelithiasis, and although several have been said to be free from jaundice, in no single case have I failed to find an icteric tinge in the conjunctivæ after an ague-like seizure.

Those cases, occurring with very little pain and with very little jaundice, naturally come ticketed with various other diagnoses. Recently I saw a case of this kind in a gentleman of 66, who was said to be suffering from chronic blood-poisoning, due originally to an unsanitary house; the symptoms of blood-poisoning, however, completely disappeared after the removal of a number of gall-stones from his common duct. Although I made my diagnosis on the physical signs and history alone, yet the diagnosis was strengthened by the discovery of the pancreatic reaction in the urine and by the presence of thirty per cent of fat in the dry fæces.

When gall-stones are present in the gall-bladder and cystic duct, the pain commences under the costal margin and radiates to a point beneath the right shoulder-blade, whereas when the stones are in the common duct the pain is more centrally situated, and usually passes to the mid-scapular region. It may, however, be epigastric throughout, and in several cases I have found patients to complain that the pain was chiefly situated on the left side of the upper abdomen. In these instances there have usually either been adhesions of the stomach to the gall-bladder or well-marked interstitial pancreatitis. It should not be forgotten, therefore, that left-sided epigastric pain has in a number of cases been dependent on cholelithiasis.

Although Oberst and Beck have stated that they have obtained clear skiagrams of biliary calculi, I am bound to confess that in no single case have I received any help in diagnosis from the X-rays, and the only biliary stones that would be likely to prevent the passage of the Röntgen rays are those containing calcium. Cholesterine, which is the composition of most biliary stones, gives no shadows, but carbonate of lime, which enters so largely into pancreatic calculi, casts a very dark shadow. This was first pointed out by me and demonstrated on the screen as a diagnostic point when giving the Hunterian Lectures on the pancreas.

The time at my disposal does not enable me to describe all the dangers that are associated with gall-stones, but I should like briefly to mention some that may result.

The following complications may constitute the prominent conditions threatening life and requiring treatment, the original cause having perhaps disappeared or become masked by its more serious sequelæ.

1. Ileus due to paresis of the bowel, leading to enormous distention of the abdomen and to the symptoms and appearances of acute intestinal obtruction, apparently the consequence of the violent pain.

2. Acute intestinal obstruction dependent on—

(*a*) Paralysis of gut due to local peritonitis in the neighborhood of the gall-bladder.

(*b*) Volvulus of small intestine.

(*c*) Stricture of intestine by adventitious bands, originally produced as a result of gall-stones.

(*d*) Impaction of a large gall-stone in some part of the intestine after ulcerating its way from the bile-channels into the bowel.

3. General hemorrhages, the result of long-continued jaundice, dependent either on gall-stones alone or on cholelithiasis associated with maglinant disease or with interstitial pancreatitis.

4. Localized peritonitis, producing adhesions which may then become a source of pain even after the gall-stones have been got rid of. I believe that nearly every serious attack of biliary colic is accompanied by adhesive peritonitis, as experience shows that adhesions are found practically in all cases where there have been characteristic seizures.

5. Dilatation of the stomach dependent on adhesions around the pylorus.

6. Ulceration of the bile-passages, establishing a fistula between them and the intestine.

7. Stricture of the cystic or common duct.

8. Abscess of the liver.

9. Localized peritoneal abscess.

10. Abscess in the abdominal wall.

11. Fistula at the umbilicus, or elsewhere on the surface of the abdomen, discharging mucus, muco-pus, or bile.

12. Empyema of the gall-bladder.

13. Infective and suppurative cholangitis.

14. Septicæmia or pyæmia.

15. Phlegmonous cholecystitis.

16. Gangrene of the gall-bladder.

17. Perforative peritonitis due to ulceration through or to rupture of the gall bladder or ducts, leading to extravasation of infected bile into the general peritoneal cavity.

18. Pyelitis on the right side due to a gall-stone ulcerating or an abscess of the gall-bladder bursting into the pelvis of the kidney.

19. Cancer of the gall bladder or ducts.

20. Subphrenic abscess.

21. Pleurisy or empyema of the gall-bladder.

22. Pneumonia of the lower lobe of the right lung.

23. Chronic invalidism and inability to perform any of the ordinary business or social duties of life.

24. Gangrenous or suppurative pancreatitis.

25. Chronic interstitial pancreatitis.

26. Infective endocarditis.

27. Cirrhosis of liver.

28. Appendicitis due to extension of inflammation from the gall-bladder or to the impaction of a gall-stone in the appendix.

Did time permit, I could give examples from my own experience of each of these conditions.

When once gall-stones have reached the common duct, their attempted dislodgment by purely medical means is, with few exceptions, disappointing in the extreme, and the unfortunate patients are condemned to a lingering and painful illness, usually ending in death, unless the obstruction can be removed by surgical intervention.

It is safe to affirm that there is no portion of the gall-bladder, cystic, common, or primary division of the hepatic ducts which cannot, under ordinary circumstances, be reached for the removal of concretions, and that with great probability of success.

This ideal result, namely, a complete clearing of the bile-ducts, can now be so effectually performed and with such exactness and certainty by the modified operation of choledochotomy that I had the honor of introducing to the profession, that it is quite unnecessary to describe any of the older procedures, such as crushing calculi or short-circuiting the obstruction.

The advantages of the modifications suggested have since been accepted and freely acknowledged by many operators both at home and abroad.

What was formerly a most difficult procedure, involving prolonged manipulation, special appliances, and at least two assistants, and only to be undertaken after all other means had failed, is now a comparatively simple

operation in the greater number of cases, only requiring the help of one assistant and not requiring the use of any special apparatus. By this method the time involved in the operation is reduced considerably, and where adhesions do not give unusual trouble it is easy to complete the work in from thirty to forty minutes, which not only means a saving of time and fatigue to the operator, but a considerable saving of shock to the patient. I always employ a firm sandbag under the back, opposite the liver, which not only pushes the spine and with it the common duct forward so that it is several inches nearer the surface, but also acts like the Trendelenburg position in pelvic surgery by letting the viscera fall away from the field of operation. I then make a vertical incision over the middle of the right rectus, the fibers of which are separated by the finger, which I find to be the most expeditious and the most effective method of exposing the gall-bladder and bile-ducts; but when it is necessary to open either the common duct or the deeper part of the cystic duct, instead of prolonging the incision downwards, as was formerly done, I now carry it upwards to the interval between the ensiform cartilage and the right costal margin as high as possible, thus exposing the upper surface of the liver very freely. It will now be found that by lifting or rotating the lower border of the liver (if needful, first drawing the organ downwards from under cover of the ribs) the whole of the gall-bladder and cystic and common ducts are brought quite close to the surface, and as the gall-bladder is usually strong enough to bear traction, the assistant can take hold of it or of the free margin of the liver by his fingers covered with a dry sterile swab, which prevents slipping, and by gentle traction can keep the parts well exposed, at the same time that, by means of his left hand, with a flat swab or sponge under it, he retracts the left side of the wound and the viscera, which would otherwise fall over the common duct and impede the view. It will now be observed that instead of the gall-bladder and cystic duct making a considerable angle with the common duct, an almost straight passage is found from the opening in the gall-bladder to the entrance of the bile-duct into the duodenum, and if adhesions have been thoroughly separated, as they should always be, the surgeon has immediately under his eye the whole length of the ducts with the head of the pancreas and the duodenum.

The surgeon, whose hands are both free, can now with his left finger and thumb so manipulate the common duct as to render prominent any concretions, which can be directly cut down on, the edges of the opening in the duct being caught by pressure-forceps. When the duct is incised there is usually a free flow of bile, which, it must be remembered, is probably infective, but a sponge in the kidney-pouch and rapidly mopping up the bile as it flows by means of sterilized gauze pads avoid any soiling of the surrounding parts, and if thought necessary the bulk of the infected bile can be drawn off by the aspirator, either from the gall-bladder or from the common duct above the obstruction before the incision into the duct is made. After removing all obvious concretions, the fingers are passed behind the duodenum and along the course of the hepatic ducts to feel if other gall-stones are hidden there, and a gall-stone scoop, the only special instrument that I use, is passed into the primary division of the hepatic ducts in the liver and down to the duodenal orifice of the common bile-duct. In order to insure the opening into the duodenum being patent, a long probe is passed into the bowel. The incision into the bile-duct is now closed by an ordinary curved round needle held in the finger without any needle-holder, a continuous catgut suture being used for the margins of the duct proper and a continuous fine green catgut or spun celluloid thread being employed to close the serous covering of the duct. In such cases, where the pancreas is indurated and swollen from chronic pancreatitis and is likely to exert pressure on the common duct for a time, I insert a drainage-tube directly into the duct and close the opening around it by a purse-string suture, the tube being fixed into the opening by a catgut stitch, which will hold for about a week. Where this is not done, I usually fix a drainage-tube into the fundus of the gall-bladder in the same way, as this drains away all infected bile and avoids pressure on the newly sutured opening in the duct.

Although there is seldom any fear of leakage or of infection, yet, owing to the separation of extensive adhesions, there is usually some tendency to pouring out of fluid in the first twenty-four hours. I therefore generally insert a gauze drain through a split drainage-tube, bringing it out by the side of the gall-bladder drain. The wound is closed in the usual way by continuous catgut sutures, first to the peritoneum and deep rectus sheath, next to the anterior rectus sheath, and lastly to the skin, the aponeurotic and muscular margins being further strengthened by from four to six sutures, taking up all the layers; these sutures being of twenty to thirty day catgut.

But the technique of the operation is not the only important part of the treatment of these serious cases, which require thought and care, not only before and at the time of but also subsequently to operation.

A careful study of the causes of mortality in operations on the common duct shows that hemorrhage, either immediate, consecutive, or secondary, cannot be ignored as a danger, and that shock, apart from hemorrhage, has next to claim our attention.

With due precautions, sepsis can be avoided by taking care to surround the area of operation by sterilized gauze and by mopping up the infected bile as it flows when the duct is opened. Since employing the boiled rubber gloves both for myself and my assistant, and using a sterilized gauze mask over the head and mouth, as well as other well-known precautions in the treatment of instruments and dressings, it is very seldom that healing by first intention is not obtained, and I have noticed, since securing perfect asepsis, that pain after operation is very slight as compared with what it used to be in my earlier cases.

In the chronic jaundice cases, especially when the pancreas is involved, there is a well-marked tendency to hemorrhage, which can be much lessened by giving the patient chloride of calcium for two or three days before operation and continuing it by the rectum for a few days subsequently. By its use much time is saved, as the number of vessels to be ligatured is considerably diminished in number, but I think it is very important to ligature every point that is bleeding, so as to leave the wound as dry as possible; thus not only is shock avoided, but the tube that drains the kidney-pouch can be removed easily within twenty-four hours.

Before I began to do this operation, the mortality of choledochotomy, including every case, whether complicated or simple, was 16.2 per cent (21.4 per cent in the first series, and 9.3 per cent in the second series, or together, 16.2 per cent), but, since adopting the operation for complete exposure of the bile-passages, I have performed a continuous series of 76 choledochotomies for gall-stones, with only 3 deaths, a mortality of 3.9 per cent, thus amply verifying the forecast that I then made, when I stated that I expected the mortality would be reduced to 5 per cent or less.

After I had had 53 consecutive recoveries from choledochotomy, nearly all the patients being deeply jaundiced and extremely ill at the time of operation, and a number of them being aged and very feeble, I began to hope that I might be able to reduce the mortality of the common-duct operation to the same figure (1 per cent), which has been my experience in the more simple operation of cholecystotomy for the removal of gall-stones from the gall-bladder and cystic duct, in the absence of cancer and suppurative or infective cholangitis; but this has not yet been realized, for the fifty-fourth, fifty-ninth, and sixty-first cases proved to be desperate ones, in which immediate operation gave the only chance of life. The first case, a lady aged 65, was suffering from pyæmia at the time of operation, having had two rigors a day for several days, and, besides a suppurating parotitis, she had serious heart disease and albuminuria; on opening the common duct, extremely offensive pus and bile flowed from the ducts in the liver. The next patient, a gentleman aged 65, had suppurative pancreatitis with high temperature and gangrene of the gall-bladder, accompanied by rigors and septicæmia, at the time of operation. He also had albuminuria and cirrhosis of the liver, the last being probably the cause of death, from symptoms resembling those of acute atrophy of the liver a fortnight after operation. In both of the cases, not only the bacillus coli communis, but strepto-

cocci pyogenes were also found in the pus from the common duct. The third case occurred abroad, and although I had gone a long distance to operate, I thought the patient too ill to bear surgical treatment, but when I was about to leave the next day, intending to see her again after a trial of general means, I got a message from her medical attendant to say that unless I could see my way to operate she would certainly die. She was aged 53, and had been operated on and gall-stones had been removed from the gall-bladder by another surgeon sixteen months previously, but she had never completely recovered. Recently she had had rigors and deep jaundice, associated with profound weakness. After removing a large gall-stone from the common duct I found the passage into the bowel so free that I thought I could do without drainage of the duct. The immediate progress after operation was all that could be desired, and I left feeling very hopeful, but the jaundice became more intense at the end of a week, and the patient died a fortnight later, cholæmic. I suspect that a secondary interstitial pancreatitis was responsible for the jaundice and for the untoward ending. It would have been better to drain the common duct in this case, as I generally do when I cannot drain the gall-bladder, and had I done so, I think the result would have been different.

I have done my best to give a description of the symptoms, complications, diagnosis, and treatment of common-duct cholelithiasis, but what I want particularly to emphasize is, that as gall-stones are well known to produce such serious complications and dangers as I have described, as they are usually easily diagnosed in their early stages before danger has arisen, and as their removal in this early stage can be effected with very little risk,—at the outside, one per cent,—it seems to me that the wisest course is not to wait for complications to arise, but to advise the removal of the disease at an early period and so prevent the serious sequelæ.

NORTHWESTERN UNIVERSITY MEDICAL SCHOOL

Department of Surgery

LEXER'S OPERATION FOR REMOVING THE GASSERIAN GANGLION

By WELLER VAN HOOK, A. B., M. D.

Professor Surgery, Northwestern University Medical School; Attending Surgeon Wesley Hospital; Interne Cook County Hospital, 1887

LEXER'S modification of the common operation for removal of the Gasserian ganglion deserves greater popularity than it has yet attained. Having utilized Lexer's[1] technique in his latest three cases, the writer wishes to present it with his commendation to American surgeons.

The essentials of an operation upon the Gasserian ganglion are that adequate access for the manipulation of the deep tissues be provided; that the minimum damage be inflicted upon structures not involved in disease; and that the surgical sequences of the operation be comparatively unimportant.

[1] Lexer: Archiv. f. Klin. Ch. bd. lxv, h. 4

It is to be said of the Hartley-Krause technique that by it these conditions are fairly well satisfied. But the importance of preserving the portion of bone removed is questionable if the mass taken out is comparatively small because the new connective tissues produced by the proliferation of the neighboring structures is so abundant and so strong that the dura is well protected. One must remember, moreover, that the part of the skull interfered with in the operation to be considered is well protected from injury. Furthermore, the bony part of the flap, if replaced, is liable to undergo necrosis, which, when it does not result fatally, may subject the patient to the annoy-

ance and suffering incident to a secondary operation.

The technique of the operation is as follows:

1. The skin incision (Fig. 1) must in no case injure the branches of the facial nerve supplying the orbicularis oculi. This is avoided by accurately following the lines of the incision as indicated in the figure. The anterior incision of the flap begins somewhat above the upper angle of the malar bone, behind its frontal process, while the posterior portion of the incision lies about a finger-breadth in front of the ear. The upper curve of the horseshoe is not to project above the line that joins the supraorbital margin with the upper border of the concha.

2. The arch of the malar bone, as it is crossed by the posterior part of the incision, is divided in front of the maxillary joint with a wire saw. Then, through the anterior incision, the malar bone is divided by means of a chisel.

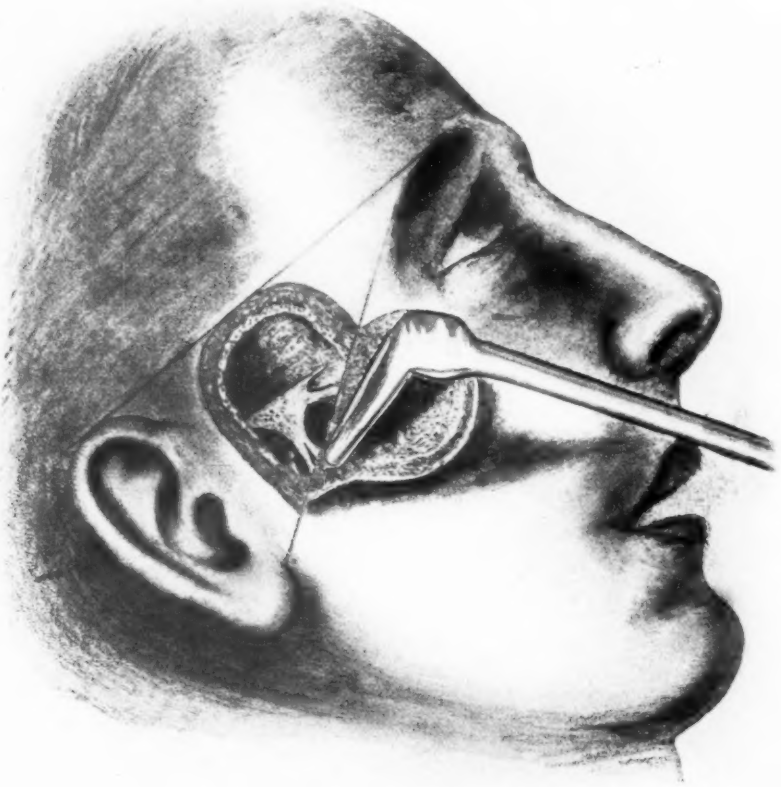


Fig. 1. After Lexer. Shows the incision, the lines which limit it, the flap turned down and the exposure of the ganglion after removal of the bone.

3. The flap embraced by this curved incision, consisting of skin, muscle, periosteum, and a portion of the malar bone, is separated from the skull as far back as the infra-temporal crest and rendered movable by separating from the crest the origin of the external pterygoid with its periosteum, laying bare the base of the skull back to the foramen ovale. The hemorrhage from the veins which pass through the base of the skull to the pterygoid plexus ceases upon tamponade, by which, at the same time, the infratemporal fossa is rendered accessible very conservatively. The flap is drawn downward and forward by means of a dull hook. In the depths of the wound are to be seen the third branch of the trigeminus, and behind it the meningeal artery.

4. The skull is opened (Fig. 2) by chiseling out the bone to an extent corresponding to the size of the flap. The gap in the skull is about three centimeters broad, and at first large enough to introduce the index finger, which presses back the dura to the foramen spinosum. The bone is removed with rongeur forceps up to this point.

5. The middle meningeal artery is ligated at the foramen spinosum by means of a long-handled aneurism needle.

6. The dura is next separated as far back as the foramen ovale so that the third branch of the nerve is visible within the skull. While the brain-retractor holds back the dura, the base of the skull is still farther bitten away until the foramen ovale is opened and the third branch can be lifted out of the canal with a hook and included in a loop of thick thread.

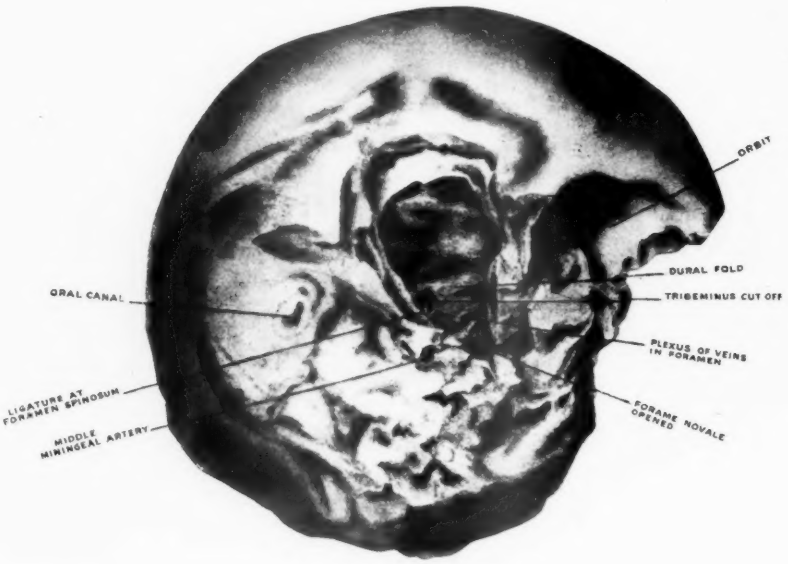


Fig. 2. From Lexer: to show the opening through the skull.

7. At this point the upper part of the body is raised almost to a sitting posture. This maneuver was suggested by von Bergmann, and is a most useful addition to the technique of Gasserian ganglion surgery allowing as it does a large part of the cerebral spinal fluid to flow into the spinal canal. The writer can testify that the tension of the dura is surpris-

ingly diminished, and that the brain can be easily raised with its coverings from its bony bed.

In the dissection and removal of the ganglion the method of Krause is pursued and requires no special description here.

The first of the three cases operated upon by this method was that of a patient of Dr. Fiebiger of Waterloo, Wisconsin. A man about forty years of age had suffered for a long time from trifacial neuralgia, involving all three of

Fig. 3. Case II. The picture shows (1) facial paralysis due to an earlier operation, (2) the line of incision which ran through the old scar, and (3) the area of anæsthesia.

the branches. Less severe methods having been tried by others without affording relief, excision of the ganglion was undertaken by Lexer's method. No technical difficulties were encountered other than those usually met with and the ganglion was satisfactorily removed. Careful examination of the part excised showed the body of the ganglion and a portion of each of its branches.

The patient made a rapid recovery from the effects of the operation, showed the usual area of anæsthesia, became free from pain at once and soon returned to his home. Owing to the interference with the muscles of mastication considerable difficulty was experienced in opening the jaw. The writer is convinced that this difficulty could easily have been overcome by forcibly opening the mouth under gas anæsthesia with the screw-gag. The patient also had some pains, apparently involving the terminal branches of the nerve of the opposite side of the head in the region of the scalp. These pains, however, did not seem to the writer to be of special import. Nevertheless, the patient, who had long been despondent, took a pessimistic view of the situation and committed suicide by hanging about two months after the operation.

The second case was that of Mrs. M., referred to the writer by Dr. W. N. McChesney of Chicago Heights, Illinois.

Case 2.—Mrs. M., aged 55, housewife, has had very good health, aside from the present trouble. About twenty years ago she began to have pain in the right side of the face extending from the zygomatic arch downward to a little below the angle of the jaw. There was also a point of pain in the cheek in front of the jaw. The suffering was so intense and persistent that life was a burden. All the teeth on that side of the jaw were removed without relief. At different times two operations through the mouth and one through the cheek were performed, in the endeavor to destroy the affected nerves. Some relief was obtained from the first of these operations. Upon the recurrence of the suffering an operation was submitted to at the hands of the late distinguished Dr. Edmund Andrews.

Dr. Andrews's description of this operation, embodied in a letter to the husband of the patient, is of such historic interest that it is included in this report.

January 19, 1893.

Mr. M. B. M.: *My dear Sir*,—Mrs. M's case was one of violent neuralgia of the right inferior maxillary nerve, for which two operations had been performed on the nerve. The pain having returned with intolerable severity, I operated on the semilunar ganglion inside the skull, from which the painful nerve springs.

I made a large flap of skin by a curved incision (the patient being under ether) and turned the flap forward, so as to uncover a space from above the zygomatic arch down to the lower jaw. I then turned it down on the lower jaw, carrying the masseter muscle with it. This

Fig. 4. Case III. Shows the area of sensory disturbance due to removal of the ganglia and the recent scar.

uncovered the temporal muscle. I sawed off the coronoid process of the jaw and turned it up, carrying the temporal muscle with it. The bleeding, which was profuse, being stopped, I sought for the nerve, but could not find it, the previous operation probably having destroyed it, and thus prevented me from using it as a guide to the foramen ovale, where the nerve emerged from the skull. I therefore dissected out the tissue deeply in behind the upper jaw, and finding the free edge of the external pterygoid plate, followed it up to the floor of the skull, where the foramen ovale lies. I then pushed a probe through the foramen into the skull, pushing it the whole length of the ganglion. I then set a trephine just to the right of the probe and took out a circle of bone from the floor of the skull, close to the foramen. Then with bone instruments I took away the bony division between the trephine hole and the natural foramen ovale, and with a very small surgical spoon began to scoop away the substance of the ganglion. Blood flowed profusely and obscured the view, obliging me to proceed slowly and by touch rather than by sight.

At this stage the patient began to grow feeble from shock and bleeding, so that the pulse became very weak. I therefore hastened the operation, scooping away only the lower part of the ganglion, from which the painful nerve sprang, and not fully removing the upper part, which would have required considerable time, and endangered the patient in her failing condition. I then stopped the blood with a tampon and closed up the flaps.

Her pain is wholly gone, and the innervation of the ophthalmic branch is not impaired. Her power to shut the eye is not perfect yet, but probably will become so. Meanwhile she must keep it closed in sleep by a bandage to prevent dryness from injuring it.

EDMUND ANDREWS, M. D.

Subsequent to this operation by Professor Andrews, a period of complete relief lasting for three years was experienced. At that time the pain began to appear again, but was not so severe and was more easily controlled. During the last two years the pain has been constant, rather severe and has interfered greatly with the patient's happiness. A complete paralysis of the right side of the face followed the operation by Dr. Andrews.

Owing to the presence of old scars, it was feasible, in my operation, to extend the incisions downward somewhat farther than in the former case. This, however, gave no special advantage for the completion of the work. The site of the old bone opening was easily found, and the massive scars which bound together the various tissues were pushed away from the skull by means of the periosteotome. The old opening in the bone was found practically closed, and a new opening had to be made with the chisel. This was accomplished at the upper limit of the area which it was desired to expose. With the rongeur forceps the bone was then removed carefully down to the region of the foramen ovale, which could no longer be accurately recognized. Next the middle meningeal artery was sought but was not found and it was necessary to proceed by simply pushing away all structures from the base of the skull until its supposed point of entry was passed. The dura was separated from the inner surface of the skull and the bone sufficiently bitten away to give access to the usual site of the ganglion. The only relic of the ganglion that could be even tentatively recognized was a small strand of tissue about one and a half centimeters long, half a centimeter broad, and a few millimeters thick, which lay well back toward the limit of the operative field. This could be removed only by means of the scissors, at the hazard of opening into the dural cavity. The dura was separated from the skull by dull and sharp dissection until it was certain that all the roots were divided, if not entirely removed. The only advantage afforded by the old operation was enjoyed

at this stage of the work, during which there was but little hemorrhage owing to the dense cicatrization.

Immediately after the operation the patient expressed gratification that the pain had passed away, the only discomfort mentioned being due to a sort of headache, different entirely from the neuralgia. For this, a quarter-grain dose of morphia was given, the only dose of anodyne she received after the operation. Before the operation, she had been taking two grains per day for months.

Anæsthesia followed the operation over an area a little larger than that usually noted. The motor nerve had been severed at the former operation, so that the right side of the face remained paralyzed.

The wound healed with great rapidity, without complication, and the patient went home well on the ninth day.

One marvels at the amount of destruction of the ganglion effected by Dr. Andrews, and at the long period of relief from suffering enjoyed by the patient. It must have required great courage and skill to perform the only operation known to him at that early day of the surgical development of Gasserian ganglion surgery, and the result he obtained amply justified his effort.

CASE 3.—John N., referred by Dr. T. W. VanHorne, Grant Park, Illinois, is a farmer, 65 years old, who, for a number of years, suffered from neuralgia of the first and second branches of the fifth nerve, for which the writer performed Thiersch's peripheral operation two years ago. This gave relief for ten months. Since then the pain has been so great that extirpation of the ganglion was at last agreed to.

The operation was typical and the relief from the neuralgia immediate. The patient sat up after 24 hours and began walking on the second day. There was some ecchymosis and œdema about the conjunctiva for several days; but no corneal ulceration took place. The patient is now free of pain.

The area of sensory disturbance is shown in Fig. 4.

COOK COUNTY HOSPITAL

Department of Surgery

ACUTE POST-OPERATIVE DILATATION OF THE STOMACH, WITH REPORT OF A CASE FOLLOWING NEPHROPEXY

BY ALBERT E. HALSTEAD, CHICAGO

Professor Surgery Post-Graduate Medical School; Attending Surgeon to the Cook County and St. Luke's Hospitals; Consulting Surgeon to the Illinois Charitable Eye and Ear Infirmary; Interne Cook County Hospital, 1891

Acute dilatation of the stomach in its most severe type is a rare condition, and usually terminates fatally within a few days. As a post-operative complication of surgical conditions, it has received but scant mention in literature, and is, in our opinion, frequently overlooked in the absence of a post-mortem examination.

The following case referred to me by Dr. Charles H. Lodor, and operated on by me, in 1902, at the Chicago Baptist Hospital, presented the clinical features and termination of a typical case of acute dilatation of the stomach following fixation of a movable right kidney in an apparently otherwise healthy young woman. The clinical diagnosis was verified at the autopsy.

Miss Kate U., a stenographer, age 18, was admitted to the Chicago Baptist Hospital July 8, 1902. She complained of pain in the right side of the abdomen, which was increased on standing or walking. On physical examination, nothing abnormal was found in the lungs or heart. Examination of the abdomen was also negative, excepting for the presence of an extremely mobile right kidney, which was tender on pressure and somewhat larger than normal. The range of mobility permitted the kidney to be moved downward to

the level of the anterior superior iliac spine, and inward to the median line. She was sparely built, but not emaciated; appetite fairly good; bowels regular. Urinalysis showed the quantity to be normal with a trace of albumin, but no casts or blood. Fixation of the kidney was recomended by Dr. Lodor, and the case transferred to my service.

Operation under morphine-ether anesthesia; nothing unusual was noted at the time of the operation, which was completed in forty minutes. There was no hemorrhage, and no unusual traction was made on the pedicle. The kidney was anchored by removal of the major portion of the fatty capsule, then narrowing the pouch containing the kidney by suturing the fascia of Gerota to the lumbar fascia. A strip of gauze was passed down beneath the lower pole of the kidney to lend additional support. The peritoneal cavity was not opened. The operation was completed with the patient in excellent condition.

During the day of the operation there was considerable pain and nausea complained of. Emesis once, some hours after returning to bed. The second day the temperature ranged from 99° to 100° F. The pulse was between 80 and 100, and of a good quality. During this twenty-four hours there was 20 ounces of urine voided, which contained neither albumin nor casts. The nausea was intense and vomiting frequent, though not in unusual quantity. During the night there was extreme restlessness, which did not yield to one hypodermic injection of one-eighth grain of morphine.

The third day the temperature ranged between 99 and 101. The highest pulse-rate recorded was 110. Restlessness more marked; nausea more intense; vomiting at frequent intervals of a dark green fluid. The abdomen was moderately distended and uniformly tympanitic. The patient at this time first complained of pain in the epigastrium. The wound was dressed and the gauze packing removed. Nothing unusual was noted. The secretion of urine during the third twenty-four hours dropped to 12 ounces and contained albumin and a few hyalin casts. The thirst was intense. The bowels moved with an enema of salts and glycerin. On the fourth day there was no marked change in the patient's condition. The temperature did not register over 99°; the pulse reached 112. The abdominal distension increased somewhat. The bowels moved freely. The stool was thin and watery in character. Nausea and vomiting continued.

On the fifth day the abdominal distension was increased; the vomiting occured at longer intervals and the quantity increased. The stomach-tube was introduced and about 2½ pints of fluid withdrawn. This gave temporary relief. The fluid withdrawn was greenish-black and stringy; there was no fecal odor. The bowels moved slightly after an enema. Toward the end of the day the extreme restlessness gave place to drowsiness, with at times transient delirium. The urinary secretion fell to four ounces in twenty-four hours. There was albumin and casts in abundance.

On the sixth and last day the stupor gradually deepened, the pulse-rate increased, reaching a maximum of 140. The temperature was normal. Vomiting occurred twice. The quantity was large. The abdominal distension was enormous, with dullness on percussion over its entire surface. The mental condition prevented the use of the stomach-tube. After vomiting a quantity of fluid, estimated at about five pints, the respirations suddenly ceased at 12 M.

An autopsy was made by the resident pathologist, Dr. J. L. Adams, eight hours after death. Examination of the abdomen only was permitted. The abdominal cavity was completely filled by an enormously distended and dilated stomach, which assumed a V-shape, the apex reaching below the pelvic brim. The intestines, excepting the first portion of the duodenum, were collapsed and lay compressed against the lateral abdominal walls. The first portion of the duodenum was dilated with a lumen equal to about that of the normal cecum. The dilatation which affected the stomach, pylorus, and first part of the duodenum terminated sharply at the point where the descending limb of the duodenum dipped underneath the peritoneum. The stomach contained about three pints of greenish viscid fluid and some gas. The walls of the stomach, though attenuated, were quite nor-

mal in appearance. There was no microscopic examination of the stomach-wall. The pylorus was not obstructed. The peritoneum was everywhere smooth and glistening. There was no free fluid in the peritoneal cavity. The operation wound was healthy in appearance, and healing had progressed as it would have under ordinary conditions. The peritoneal cavity had not been opened at the operation.

The first to describe fully this most severe type of acute dilatation of the stomach was Fagge, in 1872. He recorded four cases, two of which he had personally observed. Thompson, in 1902, in a monograph, reported 5 cases of his own and collected 39, in which dilatation occurred from various causes, from the literature. In four of his cases, death was the direct result of the dilatation, while in the fifth this condition occurred as a complication of fracture of the base of the skull and vertebra, and could not be considered as the immediate cause of death.

The second case in his report is very similar to the one here reported, death having occurred from acute dilatation of the stomach five days after an exploratory operation on the kidney. The patient was a young man of 26 years, otherwise in good health. Vomiting began immediately after the operation and continued until death. The temperature remained normal, and the pulse ranged from 120 to 140. There was no urinary disturbance. At the autopsy the stomach and duodenum were found greatly distended, completly filling the abdominal cavity. There was no pyloric stenosis and no previous history of stomach disease.

In discussing the etiology of acute dilatation of the stomach in general, Thompson divides the cases reviewed by him into five groups, the last of which, alone, concerns us. These are:

1. Those in which dilatation occurred without any cause being apparent.

2. Those in which, after death, some other lesion was found.

3. Those where some gross indiscretion of diet seemed to be the chief cause.

4. Those in which dilatation followed an injury.

5. Those that followed a surgical operation, no other lesion being demonstrable at the autopsy.

In the 44 cases collected by him, 12 followed surgical operations. Of these, 6 were upon abdominal organs, 3 being upon the gall-bladder, 1 ovariotomy, and 2 upon the kidney. The latter were extraperitoneal, but, strictly speaking, abdominal. In all, death was due to this complication, the progress of the case being otherwise undisturbed. Of the other surgical conditions in which this complication proved fatal are mentioned excision of the hip, amputation of the leg, operation on the knee, resection of the ankle, excision of the elbow, and amputation of the breast. Of those that followed injuries, and which are to be considered surgical, were one after severe injury to the abdomen, and one after fracture of the base of the skull and vertebra.

A fatal termination, though common, does not invariably follow when this complication exists. Riedel reports two cases of acute dilatation of the stomach following cholecystotomy, which recovered. He considers operations on the gall-bladder especially predisposing to acute dilatation. Müller reports five cases, two of which came to autopsy and two recovered. There undoubtedly exist minor degrees of dilatation that speedily recover spontaneously or yield to medical treatment. Many cases are undoubtedly overlooked. After operations upon the kidney or gall-bladder, pain with hyperemesis lasting for several days is not uncommon. Probably, if careful examination were made of the stomach during this time many cases of acute dilatation could be demonstrated.

Mayo Robson and Moynihan mention in their book two cases that recovered after rapid dilatation, associated with symptoms of collapse and suppression of urine. In one, a female aged 35, the symptoms began one week after a cholecystotomy, and yielded to stomach-lavage and hypodermic administration of strychnine. In the second, the stomach symptoms set in two weeks after an abdominal hysterectomy. The pulse became very rapid, the face pinched, and the urine diminished in quantity. Examination showed the lower border of the stomach as low as the symphysis

pubis. The same treatment as in the first proved effectual. The stomach returned to its normal size within a week.

Of the pathology of acute post-operative dilatation of the stomach we know but little. Albrecht, who reports 2 cases and collected 19 from the literature, considers the essential cause to be a constriction of the intestine at the duodenojejunal angle, the result being simply an ileus with secondary dilatation above. He adopts the suggestion of Glenard that an overdistended loop of small intestine may by traction upon the mesentery constrict the intestine at the point where the superior mesenteric artery crosses the duodeno-jejunal junction, the artery and the root of the mesentery acting as the constricting band.

The weight of an overdistended stomach pressing down the intestines, some of which later reach the pelvis, he regards as possibly the initial factor in the obstruction. In his second case he found the small intestines in the pelvis, and was able to demonstrate narrowing of the terminal portion of the ascending duodenum by the tense overlying superior mesenteric artery. This, he believes, explains the abrupt termination of the dilatation at the duodeno-jejunal angle. He admits that a condition of atony of the stomach must be assumed in order to explain the primary distension of the stomach and its failure to overcome the slight constriction that must at first exist. The strongest argument against this theory is that the dilatation does not always terminate at the duodeno-jejunal angle. In one of Thompson's cases the stomach and eight feet of small intestine were dilated. In many cases the symptoms of ileus, which are dwelt upon at length and used to support his theory of obstruction, do not exist.

The generally accepted explanation of acute dilatation of the stomach is, that there is a paralysis of the stomach-wall, either central, or reflex through the splanchnic nerves. There probably exist a number of factors in the causation of this paralysis. Probably, in the post-operative cases, a toxine is formed, possibly a result of the anesthetic which acts either directly on the motor nerves or upon the centers in the medulla. In some cases it would appear as if traction upon or handling of the organs in the upper half of the abdomen was the immediate cause. This is evidenced by the relative frequence with which this complication has followed operations upon the gall-bladder and kidney.

In both of Riedel's cases, adhesions between the stomach and neighboring structures existed. He ascribes the dilatation to the trauma incident to the separation of these adhesions. That reflex paralysis from dragging upon the nerves is not the cause in all, is shown by the cases that have followed operations upon parts of the body remote from the stomach.

It is also probable that when acute dilatation follows an operation or an injury there existed some degree of atony before the operation or injury, which strongly predisposed to the acute dilatation that followed. This would suggest the advisability of a routine examination of the stomach, particularly as to its motor sufficiency preparatory to operations upon any of the abdominal organs.

The symptoms of acute post-operative dilatation of the stomach are so characteristic that the attention need only be directed to them to permit of an early and certain diagnosis of this complication. The earliest and most common is the nausea and vomiting which is present from the beginning, and which increases as the dilatation becomes greater. The gradual increase in the quantity of fluid vomited, with the symptoms of collapse and the distention of the abdomen, distinguishes this condition from the ordinary post-operative vomiting that follows ether anesthesia so frequently. The abdomen becomes distended, but dull on percussion, instead of being tympanitic, as in ileus, either from inflammation or from paralysis of the intestine without peritonitis.

The temperature mostly remains normal; at times is subnormal. The pulse increases in frequency and the secretion of urine is generally diminished. Frequently there is complete suppression. The contents of the enormously distended stomach may be mistaken for free fluid in the peritoneal cavity. Indeed, the condition may readily be mistaken for post-operative suppurative general peritonitis. The use of the stomach-tube

will demonstrate the presence of fluid in the stomach. The excessive quantity of fluid that may be withdrawn will indicate the unusual size of the stomach, and give temporary relief by diminishing the intra-abdominal tension. The change in contour of the abdomen and the diminished area of dullness that follows removal of the fluid will eliminate the possibility of the fluid being free in the peritoneal cavity and permit of a correct diagnosis being made.

A sufficient number of cases of acute post-operative dilatation of the stomach have recovered to lead us to hope that an early diagnosis will in the future be made more frequently, and that with proper treatment the death-rate, which is now exceedingly high, will be lowered. In the cases reported, the diagnosis has mostly been made at the autopsy. The treatment followed in those cases where the diagnosis was made early has been fairly successful. Müller, who was able to save two cases, lays great stress upon the postural treatment, the pelvis being elevated and the patient so placed that the stomach can be readily emptied, retraction of the distended viscus favored by gravity. He also employed the stomach-tube frequently. In general, the plan of treatment may be briefly stated as consisting in stimulants, preferably the hypodermic injections of strychnine administered to the full physiologic limit. Rectal alimentation, with complete rest of the stomach, secured by frequent emptying of the viscus by means of the stomach-tube, should be employed. The pain, which is frequently severe, may be controlled by the judicious use of morphine hypodermically. The thirst from the loss of large quantities of fluid through the stomach should be relieved by saline solution given hypodermically or through the rectum. Where collapse is imminent, or where suppression of urine exists, intravenous administration of saline solution may be resorted to with propriety. In the most severe type of this complication, where the remedial agencies just referred to are not sufficient to control the dilatation, we should resort to surgical measures to relieve the overdistended stomach. Drainage of the stomach, either through a gastric fistula or through a gastroenterostomy, would appear rational. The patient's condition, under these circumstances, would render any surgical procedure extremely hazardous.

BIBLIOGRAPHY

1. Albrech, Paul Arnold. Ueber arterio mesenterialen darmverschluss, an der Duodeno-jejunalgrenz und seine ursüchich Beiziehung zur magener-weiterung. Virchow's Archiv., bd. clvi, heft 2, S. 285.
1. Fagge, Hilton. Guy's Hosp. Rep. 1872–73.
3. Glenard. Presse Med. Belge, 1889.
4. Kundrat. Wein. Med. Woch., 1891.
5. Robson-Mayo and Moynihan. Diseases of the Stomach and their Surgical Treatment.
6. Thompson H. Campbell. "Acute Dilation of the Stomach." William Wood & Co., 1902. Lancet, Aug. 2, 1902.
7. Editorial. Jour. Amer. Ass'n, Aug. 19, 1899; Feb. 9, 1901; Oct. 25, 1902.
8. Neck. Centralblatt für die Grenz. der Med u. Chirurgie, bd. viii, Nov. 14, 1905.

pubis. The same treatment as in the first proved effectual. The stomach returned to its normal size within a week.

Of the pathology of acute post-operative dilatation of the stomach we know but little. Albrecht, who reports 2 cases and collected 19 from the literature, considers the essential cause to be a constriction of the intestine at the duodenojejunal angle, the result being simply an ileus with secondary dilatation above. He adopts the suggestion of Glenard that an overdistended loop of small intestine may by traction upon the mesentery constrict the intestine at the point where the superior mesenteric artery crosses the duodeno-jejunal junction, the artery and the root of the mesentery acting as the constricting band.

The weight of an overdistended stomach pressing down the intestines, some of which later reach the pelvis, he regards as possibly the initial factor in the obstruction. In his second case he found the small intestines in the pelvis, and was able to demonstrate narrowing of the terminal portion of the ascending duodenum by the tense overlying superior mesenteric artery. This, he believes, explains the abrupt termination of the dilatation at the duodeno-jejunal angle. He admits that a condition of atony of the stomach must be assumed in order to explain the primary distension of the stomach and its failure to overcome the slight constriction that must at first exist. The strongest argument against this theory is that the dilatation does not always terminate at the duodeno-jejunal angle. In one of Thompson's cases the stomach and eight feet of small intestine were dilated. In many cases the symptoms of ileus, which are dwelt upon at length and used to support his theory of obstruction, do not exist.

The generally accepted explanation of acute dilatation of the stomach is, that there is a paralysis of the stomach-wall, either central, or reflex through the splanchnic nerves. There probably exist a number of factors in the causation of this paralysis. Probably, in the post-operative cases, a toxine is formed, possibly a result of the anesthetic which acts either directly on the motor nerves or upon the centers in the medulla. In some cases it would appear as if traction upon or handling of the organs in the upper half of the abdomen was the immediate cause. This is evidenced by the relative frequence with which this complication has followed operations upon the gall-bladder and kidney.

In both of Riedel's cases, adhesions between the stomach and neighboring structures existed. He ascribes the dilatation to the trauma incident to the separation of these adhesions. That reflex paralysis from dragging upon the nerves is not the cause in all, is shown by the cases that have followed operations upon parts of the body remote from the stomach.

It is also probable that when acute dilatation follows an operation or an injury there existed some degree of atony before the operation or injury, which strongly predisposed to the acute dilatation that followed. This would suggest the advisability of a routine examination of the stomach, particularly as to its motor sufficiency preparatory to operations upon any of the abdominal organs.

The symptoms of acute post-operative dilatation of the stomach are so characteristic that the attention need only be directed to them to permit of an early and certain diagnosis of this complication. The earliest and most common is the nausea and vomiting which is present from the beginning, and which increases as the dilatation becomes greater. The gradual increase in the quantity of fluid vomited, with the symptoms of collapse and the distention of the abdomen, distinguishes this condition from the ordinary post-operative vomiting that follows ether anesthesia so frequently. The abdomen becomes distended, but dull on percussion, instead of being tympanitic, as in ileus, either from inflammation or from paralysis of the intestine without peritonitis.

The temperature mostly remains normal; at times is subnormal. The pulse increases in frequency and the secretion of urine is generally diminished. Frequently there is complete suppression. The contents of the enormously distended stomach may be mistaken for free fluid in the peritoneal cavity. Indeed, the condition may readily be mistaken for post-operative suppurative general peritonitis. The use of the stomach-tube

will demonstrate the presence of fluid in the stomach. The excessive quantity of fluid that may be withdrawn will indicate the unusual size of the stomach, and give temporary relief by diminishing the intra-abdominal tension. The change in contour of the abdomen and the diminished area of dullness that follows removal of the fluid will eliminate the possibility of the fluid being free in the peritoneal cavity and permit of a correct diagnosis being made.

A sufficient number of cases of acute post-operative dilatation of the stomach have recovered to lead us to hope that an early diagnosis will in the future be made more frequently, and that with proper treatment the death-rate, which is now exceedingly high, will be lowered. In the cases reported, the diagnosis has mostly been made at the autopsy. The treatment followed in those cases where the diagnosis was made early has been fairly successful. Müller, who was able to save two cases, lays great stress upon the postural treatment, the pelvis being elevated and the patient so placed that the stomach can be readily emptied, retraction of the distended viscus favored by gravity. He also employed the stomach-tube frequently. In general, the plan of treatment may be briefly stated as consisting in stimulants, preferably the hypodermic injections of strychnine administered to the full physiologic limit. Rectal alimentation, with complete rest of the stomach, secured by frequent emptying of the viscus by means of the stomach-tube, should be employed. The pain, which is frequently severe, may be controlled by the judicious use of morphine hypodermically. The thirst from the loss of large quantities of fluid through the stomach should be relieved by saline solution given hypodermically or through the rectum. Where collapse is imminent, or where suppression of urine exists, intravenous administration of saline solution may be resorted to with propriety. In the most severe type of this complication, where the remedial agencies just referred to are not sufficient to control the dilatation, we should resort to surgical measures to relieve the overdistended stomach. Drainage of the stomach, either through a gastric fistula or through a gastroenterostomy, would appear rational. The patient's condition, under these circumstances, would render any surgical procedure extremely hazardous.

BIBLIOGRAPHY

1. Albrech, Paul Arnold. Ueber arterio mesenterialen darmverschluss, an der Duodeno-jejunalgrenz und seine ursüchich Beiziehung zur magener-weiterung. Virchow's Archiv., bd. clvi, heft 2, S. 285.
1. Fagge, Hilton. Guy's Hosp. Rep. 1872–73.
3. Glenard. Presse Med. Belge, 1889.
4. Kundrat. Wein. Med. Woch., 1891.
5. Robson-Mayo and Moynihan. Diseases of the Stomach and their Surgical Treatment.
6. Thompson H. Campbell. "Acute Dilation of the Stomach." William Wood & Co., 1902. Lancet, Aug. 2, 1902.
7. Editorial. Jour. Amer. Ass'n, Aug. 19, 1899; Feb. 9, 1901; Oct. 25, 1902.
8. Neck. Centralblatt für die Grenz. der Med u. Chirurgie, bd. viii, Nov. 14, 1905.

JEFFERSON MEDICAL COLLEGE

Department of Obstetrics

THE TREATMENT OF PLACENTA PRÆVIA

By EDWARD P. DAVIS, M. D., PHILADELPHIA

Professor Obstetrics Jefferson Medical College; Interne Cook County Hospital, 1884.

RECENT investigation has confirmed our belief that in the use of the tampon of antiseptic gauze we have the most feasible and efficient treatment of placen a prævia. We recognize, however, that this treatment is but palliative, and that it is to prepare the way for the complete emptying of the uterus. The following cases in the experience of the writer call attention to some of the dangers connected with this treatment, and lay stress upon the fact that all cases of placenta prævia are virtually those of concealed hemorrhage from placental detachment and expose the patient to the dangers of this serious complication.

CASE 1.—Multipara; had been for 48 hours under the care of two physicians. She had had several sharp hemorrhages before calling medical help. The first physician who saw the case diagnosticated placenta prævia, and advised complete rest until dilatation should be sufficiently advanced to permit delivery. Hemorrhage continuing, the second physician was called in consultation and an antiseptic tampon applied. This apparently checked the hemorrhage, and the patient was left for several hours, when she was found again to be bleeding and considerably prostrated. One of the physicians in the case then came to the city for consultation.

On seeing the case, it was found that the hemorrhage had been going on either externally or internally for the greater portion of 24 hours. The patient was blanched, with sighing respiration and very small, feeble pulse. The uterus was somewhat relaxed, and fœtal heart-sounds could not be heard. An unfavorable prognosis was given, and it was explained to the husband that a very slender chance remained, which lay in immediately emptying the uterus.

When the tampon was removed, considerable clotted blood was found against the gauze, the cervix was three fourths dilated, and a central placenta prævia was present. Version was readily made and a dead child extracted. More than a handful of blood was found in the uterus, which was douched with hot boiled water and firmly packed with iodoform gauze. The patient rallied slightly, but survived the operation less than an hour. In this case too much reliance, apparently, had been placed upon the tampon, and because exposed external hemorrhage did not occur, the patient had been allowed to drift into a hopeless syncope without delivery.

CASE 2.—Primipara, eight months advanced, with justo-minor pelvis of slight contraction, had been, during her pregnancy, exceedingly well. Although naturally frail, she had never been better, and had passed the summer under exceptionally favorable surroundings. On the day preceding the occurrence of hemorrhage she had been unusually quiet and had felt somewhat languid. The urine had been recently examined and was normal. The functions of digestion and assimilation seemed well performed. There had been no undue exertion, nor could a mechanical cause be found to explain the occurrence of hemorrhage; the movements of the child had not been as active for several days as on previous occasions.

After a good night's sleep, the patient, at breakfast, became conscious of a vaginal discharge, and found that hemorrhage was taking place. A telephone message was at once sent to me, and the patient was instructed immediately to remain absolutely quiet in bed. On examining her clothing, it was found that sufficient hemorrhage had taken place to stain through the linen. On lying down, hemorrhage apparently ceased for an hour and then recurred. Less than three hours after the first

occurrence of hemorrhage, I saw the patient, and found her with a slow regular pulse and in good general condition. She is naturally pale, and showed slightly the loss of blood. On vaginal examination the pelvic floor was long and rigid, and with some difficulty the finger could be carried into the cervix, which was almost effaced. The finger came against the membranes at one point, while about half the lumen of the os was covered by placental tissue. Very slight hemorrhage was going on, but this was constant. On palpating the abdomen the uterus was irritable and uterine contractions were beginning. As the patient had not expected the birth of her child for six weeks, she was not prepared for the accident, and a little time was occupied in getting a nurse and in securing appliances for asepsis. As soon as possible the patient was placed in the knee-chest posture, perineum retracted by a Sims speculum, and a very firm packing of ten-per-cent iodoform gauze was inserted. The patient was not left for a moment without careful observation, and assistants were summoned and preparations made to empty the uterus as rapidly as possible.

After the introduction of the packing, hemorrhage apparently ceased, although uterine contractions became more pronounced. The pulse rose very gradually, and in two hours after the introduction of the gauze the vulvar dressings were tinged with blood. The situation was explained to the husband, and he was informed that the child's life would undoubtedly be lost, and that the case must be conducted entirely in the interests of the mother. This plan of action he emphatically urged. In view of the persistence of bright hemorrhage, although the patient's general condition seemed good, it was determined to empty the uterus. Preparations were made to perform saline intravenous transfusion, and the patient was cautiously anæsthetized with ether by a skilled anæsthetizer.

On removing the packing, from four to six ounces of clotted blood was found in the gauze. A small quantity was also present in the posterior vaginal cul-de-sac. The cervix was soft and the os three fourths dilated; the membranes unruptured. The membranes were immediately ruptured and the hand carried in to perform version. It was found that the placenta covered the right half of the os and cervix, extending upward along the lower uterine segment on the right side. A foot of the child was readily grasped, but it was found that the fœtus had descended, the head presenting, into the pelvic cavity, and that there would be greater danger of rapidly separating the placenta by performing version than if the child were delivered by forceps. Accordingly, the head was grasped by forceps and the child delivered without difficulty. The cord was not pulsating on delivery, the child gasped at intervals for an hour, but could not be revived.

On removing the placenta a large handful of clotted blood was found in the uterus above the placenta. The uterus was thoroughly emptied, copiously douched with hot lysol solution, and firmly packed with ten-per-cent iodoform gauze. A laceration of moderate extent upon the left side of the cervix was immediately repaired, and small lacerations in the anterior and posterior segments of the pelvic floor and perineum were also repaired. The vagina was firmly tamponed with bichloride gauze, care being taken to make pressure against the cervix and lower uterine segment. Strychnia and ergot were freely administered by hypodermic injection. An assistant grasped the uterus firmly, holding it in an anteflexed position and watching the patient's pulse. The patient rallied well from delivery, and has passed through nearly a month of her convalescence without accident. The breasts filled excessively, and at first required close attention. The patient seemed to have little general strength, and the use of the catheter was necessary for some time. On several occasions, attacks of syncope developed, which did not become dangerous, but which were alarming to the nurses in charge. No signs of infection developed, and the patient is now in the last days of her convalescence.

In this case, although the patient was carefully watched and a tampon applied as firmly as possible, placental separation proceeded steadily, and hemorrhage, although slight, did not cease until the uterus was completely emptied. From all that could be observed, the amount of concealed hemorrhage, judging from the clots, was quite as great as that of the

hemorrhage which became visible. If the patient had been allowed to go undelivered until visible hemorrhage was alarming, she must have peri hed.

Case 3.— Multipara; a working-woman of slender physique; was brought to the Jefferson Maternity by ambulance, at the request of the physician who had been called to see her. A diagnosis of placenta prævia had been made. It was learned that the patient had been bleeding at intervals for several days, but had neglected to seek medical aid, though urged to do so.

On admission, the woman was exceedingly pale, her pulse from 100 to 110, small and compressible, and her expression exceedingly anxious. She believed herself very ill, and free hemorrhage was occurring. She seemed to be nearly at term, although no fœtal heart sounds could be heard. A firm tampon of gauze was applied as soon as possible by one of the staff, and the patient was prepared for delivery. On physical examination a central placenta prævia was found, although sufficient time was not taken to study the case thoroughly, because of the immediate necessity for stopping the hemorrhage. The cervix admitted but two fingers, and was not much softened. On seeing the case about two hours after admission, it was found that the vulvar dressing had just begun to be stained. The emptying of the uterus was immediately undertaken, and, under partial anæsthesia with ether, the hand was carried through the placenta, a foot of the child was grasped, and the body of the child drawn downward into the cervix. Considerable clotted blood was found in the vagina, but active hemorrhage ceased when the child's body was brought down. Before proceeding further, stimulants were given by hypodermic injection, and the extraction of the child was accomplished very slowly. Upon delivery, the placenta was found almost entirely separated, and upon one side of the uterus was a mass of clotted blood sufficient to fill a small basin. The uterus was thoroughly douched with hot lysol solution and very firmly packed. Intravenous saline transfusion was done at the same time by an assistant. There was no bleeding from the cervix, and no time was taken to repair lacerations, which were not extensive. The vagina was tamponed firmly as rapidly as possible, and the patient at once placed in a warm bed, the foot of which was elevated. A hot-water bottle covered with flannel was placed under the cerebellum, and a rectal injection of freshly made strong, hot coffee and saline solution was immediately given. The inhalation of oxygen was continuously practised.

Under strychnia, ergot, digitaline and intravenous and rectal injections, the patient reacted somewhat and became conscious. She remained however, severely shocked, and believed herself in a dying condition. The patient was placed in charge of the House Staff with instructions to again perform intravenous saline transfusion, and to renew stimulation at the first sign of collapse. About two hours after delivery, syncope suddenly developed. The other arm, which had been prepared, was immediately utilized for intravenous transfusion, and stimulants were again given. The patient was pulseless at the wrist, but conscious, very thirsty, and in a mental condition of pitiable anxiety. She again rallied, but became restless and begged to be put to sleep. She was able to swallow small quantities of hot fluid and had no nausea. Her pulse was barely perceptible at the wrist. On seeing the patient, the necessity for rest was evident. Accordingly, the patient was given an eighth grain of morphia, hypodermically. The uterus was firm and well contracted. A large pad was placed above it, extending across the abdomen, and a tight abdominal binder was applied over the whole abdomen. External heat was renewed about the patient, the room was darkened, and although the patient was narrowly watched, she was allowed to remain absolutely without disturbance. She gradually passed into a tranquil condition, and finally slept at intervals for a short time. She steadily gained and being fortunately able to retain nourishment and stimulants by the mouth, has made a slow but steady convalescence. Her red blood cells were reduced to two million and her hemoglobin to between twenty and thirty per cent. Two weeks after delivery she had a rise of temperature to 102° F., accompanied by pain and thickening in the left groin. The vein could not be outlined, nor could a distinct phlebitis

be detected. This subsided in a few days, and the patient has gone on to convalescence.

CASE 4. — A multipara in her tenth pregnancy was seen in consultation. She was a stout, flabby woman with a large, much relaxed abdomen, and had been having occasional discharges of blood for several days. The surroundings of the patient were such that an aseptic examination was practically impossible. The patient was accordingly brought to the Jefferson Maternity by ambulance. Placenta prævia was expected, and the patient was prepared for immediate delivery. On examination, a central placenta prævia was found, the os admitting three fingers. As the cervix was unusually resisting and the hemorrhage not severe, a firm tampon was applied and allowed to remain for one hour. The opportunity was taken to give the patient needed stimulation. On removing the tampon, the cervix could be readily dilated. The placenta was at once perforated, and the patient very slowly delivered of twin children. As the birth-canal was much relaxed, an anæsthetic was not given. Following the delivery of the children a very large placenta was removed and a considerable mass of clotted blood emptied from the uterus. After hot douching and packing and the free administraiton of strychnia and ergot, the uterus contracted and fairly well, although manual compression was required for a number of hours after delivery. Intravenous transfusion was performed, and the patient made an excellent recovery. The children were between seven and eight months and lived for several weeks, dying of inanition and failure to digest.

The preceding cases have been selected as typical of placenta prævia, and especially as illustrating the salient points in treatment. We desire to emphasize the fact that each case of placenta prævia, of whatever kind, is also a case of concealed hemorrhage. When the physician makes a diagnosis of placenta prævia he becomes personally responsible for the delivery of the patient and the complete emptying of the uterus so soon as possible. Nothing short of this can be relied on to save the patient's life. The mode of delivery must be selected with reference to the individual case. The value of the tampon lies in the fact that, when properly applied, it lessens hemorrhage, although it never entirely prevents it. Unfortunately, it may seriously mislead a physician by temporarily arresting visible hemorrhage while directly encouraging placental separation and concealed bleeding. In partial placenta prævia, or, rather, in other varieties of placenta prævia then central, rupture of the membranes is not absolutely efficient. Even though the fœtus be forced downward against the cervix, placental separation may still occur, extending upward along the wall of the uterus above the presenting part.

The tampon has the further merit of preparing the cervix for rapid delivery. While placenta prævia, in itself, softens the cervix, it especially softens the lower uterine segment and the tissues at the junction of the vagina and cervix. If the cervix be forcibly dilated, so soon as the first resistance in the cervix is overcome the tissues may tear to a dangerous degree. The writer observed, on one occasion, a dangerous tear of the tissues of the lower portion of the uterus in placenta prævia following the use of Bossi's dilator. For this reason we believe that Bossi's dilator should not be employed in these cases, and that the cervix should not be rapidly and forcibly dilated until it is thoroughly softened and has been partially dilated by nature's efforts. The hand will always remain the safest preliminary dilator, while the body of the child will complete the process. So soon as is consistent with the safety of the mother, the uterus must be completely emptied.

If possible, the operator should have abundant assistance at this time. If anæsthesia is employed, it should be as light as possible and skillfully produced. Intravenous saline transfusion is frequently required in these cases, and may be given before the uterus is empty and while the body of the child is serving as a plug. Strychnia and ergot hypodermically should be administered before the uterus is emptied.

The emptying of the uterus should be complete, and especial care should be taken not only to tampon the cavity of the womb, but also to tampon firmly the lower uterine segment not only with a uterine packing, but also with a firm packing of gauze, filling the vagina.

To prevent secondary shock, the Faradic current is most useful, with the continuous application of heat under the cerebellum. If the heart's action is exceedingly weak, ergot must be used cautiously after delivery, lest its action increase the burden thrown upon the heart. Digitalis may be substituted for it. There is also danger that strychnia may be used to excess. A secondary collapse may be expected, and should be anticipated within three hours after delivery. Such a patient should not be left with a nurse alone, but should be under the charge of those who are prepared to perform transfusion whenever needed.

The dangers of septic infection in these cases are especially great, and call for the strictest precautions. Pulmonary embolism or primary thrombosis and secondary embolism may also occur. Such a patient should be kept absolutely quiet and not allowed to change her position rapidly or to rise suddenly in bed. After the patient's recovery from labor, should subinvolution be present with chronic endometritis, curettage should be done, and, if possible, a healthy condition of the endometrium should be secured. While in some cases the physician may succeed in saving the life of the child, this should not be expected, and the patient's friends should be given to understand that this will probably be impossible so soon as the diagnosis of the condition is positively made.

Were the patient in a maternity hospital, under the care of obstetricians who are accustomed to operate, in primiparæ where the cervix is unusually resisting, Cæsarean section will in some cases be found efficient in saving the lives of mother and child.

COOK COUNTY HOSPITAL

Department of Obstetrics

THE INDICATIONS FOR FORCEPS AT COOK COUNTY HOSPITAL, CHICAGO[1]

By CHARLES B. REED, M. D.

Assistant Professor of Obstetrics, Northwestern University Medical School; Obstetrician to Cook County Hospital; Associate Obstetrician, Chicago Lying-in Hospital

IT has been suspected for some years that the indications for forceps have been quite loosely and lightly construed at Cook County Hospital, and that on this account instrumental deliveries have been more numerous than are really allowable.

In order to determine with some degree of certainty just how carefully the indications were observed and with what degree of responsibility the forceps were used, a compilation has been made of the cases from 1897 to November 20, 1905.

During this period of eight years, 3,224 women have been delivered at the hospital, and of this number 186, or 5.7+ per cent, have been delivered with forceps.

A short summary of the conditions found is as follows:

Primiparæ, 151, or 81 per cent; multiparæ, 29, or 15.6 per cent; para not given, 6.

Position of head: O.L.A., 85; O.D.A., 27; O.D.P., 26; O.L.P., 13; after-coming head, 1; brow, 5; face, 4; breech, 1; not stated, 25.

The operations are given as: High, 25; median, 37; low, 111; and not stated, 13.

In this series, 169 mothers lived, 11 died (.6 per cent), and 14 were transferred to the surgical service for sepsis or surgical complications.

Of the babes, 155 lived and 33 died (17 per cent).

Among the minor injuries, there are reported:

[1] Great thanks are due to Dr. Davis of the interne staff for the care and effort which he expended in the tedious compilation of these cases from the mass of accumulated material.

Lacerations of vagina, perineum, and rectum, 111, or 60 per cent, of which 66 per cent were primiparæ and 34.5 per cent multiparæ; complete lacerations, 3; none at all in 56 cases.

The indication in the various operations are grouped as follows:

Inertia uteri (33) and slow labor (27)	60
Maternal exhaustion	8
Brow	5
Face	4
Occipito-posterior	17
Deep transverse arrest	5
Eclampsia	8
Contracted pelvis	14
" Schulzange " (for internes)	17
Danger to child	2
Antepartum hemorrhage	1
Prolapsed cord (1 child dead)	2
Prolapsed arm	1
Breech-foot prolapsed	1
Head arrested at brim	2
Dead fœtus	2
Nephritis	1
Not given	37

We have, then, in this series, 3,224 labors, of which 186 were terminated by forceps; that is, 5.7 per cent.

How does this compare with other institutions?

In Jena, among 2,533 labors, there were 294 forceps, or 11.6 per cent.

In Bonn, 4,155 labors: 181 forceps cases, or 4.39 per cent.

In Basel (Fehling), 2,926 labors: 156 forceps, or 5.33 per cent.

In Tübingen, 2,018 labors: forceps 3.08 per cent.

In Dresden, 7,322 labors: 206 forceps, or 2.8 per cent.

In Munich (von Winckel), 20,604 labors: 635 forceps, or 3.08 per cent.

In Vienna (Chrobak), 30,973 labors: 764 forceps, or 2.64 per cent.

These figures show that, with one exception, our average is higher than that of any of the above clinics, which are among the best known abroad, and more than twice the average found in the best of them.

Let us now examine the indications as given a little more in detail.

INERTIA UTERI AND SLOW LABOR

The first in point of numbers is inertia uteri (18 per cent), with which the slow labors, for the most part, should be conjoined.

Inertia uteri may be primary or secondary; the first being observed most commonly in the very young and the relatively old primiparæ, as well as among invalids and neurotics.

There may be such anatomical or physiological reasons for its occurrence as defective innervation of uterus or lack of development of the abdominal muscles.

In overdistention of the uterine musculature from hydramnois and multiple pregnancy will also result in slow, inefficient, and infrequent contractions.

From whatever cause it may arise, it is characterized by weak, irregular, and infrequent pains that do not advance the labor.

In secondary inertia, after a period of more or less active uterine contraction, which may almost complete the second stage, the pains cease, the uterus apparently is exhausted and seeks rest. The physical conditions are marked by a flabbiness of the organ, so pronounced that the outlines of the child can be recognized. There is no tenderness of the uterus, the pulse remains at about 100, the respiration is but slightly increased, and the patient is mentally placid.

The two conditions present considerable differences as to treatment.

In neither primary nor secondary inertia, however, can we regard the irregularity of the pains or the pain weakness as a legitimate reason for the use of the forceps, but rather as a contra-indication, so long as the mother and child are in good condition.

In any case where the possibility of inertia uteri is suspected, strych. sul. should be given in doses of $\frac{1}{30}$ grain three times daily for the three or four weeks preceding the labor, as Edgar has advised.

In the primary cases, such measures should be used as will strengthen the pains and increase their frequency, among which may be mentioned changes of position, hot sitz baths or full baths, hot vaginal douches, etc. It is important, too, to see to it that bladder and rectum are empty, as in such cases, especially with a full bladder, inertia uteri is common.

Massage of the uterus and the Kristeller expression, except for its painfulness, do good service on occasions.

In some cases the trouble seems to be due to the patient's fear of the pain and a refusal to use the abdominal muscles. In these cases and in those that seem to be of nervous origin, nerve sedatives, and especially chloral, give the best results, and toward the end of the labor, chloroform frequently has a happy effect. In other cases the pains are cramp-like and inefficient, besides being extremely painful, and here the use of a hypodermic of morphia $\frac{1}{4}$ and atropine $\frac{1}{150}$ is followed by delivery. Under such circumstances a rectal injection of 30 to 60 grains of chloral hydrate in 3–4 ounces of warm milk has been, in some instances, dramatically effective.

Before resorting to forceps, the colpeurynter should be used in the vagina or a de Ribes bag in the uterus, as a mechanical stimulant.

If, four hours after the complete dilatation of the os, to take an arbitrary stand, it is evident that the labor does not progress, or sooner if in the meantime danger should threaten the mother or child, the resort to forceps to end the labor is justifiable. In the cases of secondary inertia, the exhausted uterus must be given rest for several hours. The use of chloral and morphia in these cases frequently is followed on awakening, by strong regular pains, which terminate the labor. We cannot deny that many of these cases are best terminated by forceps, if the conditions for instrumental interference are carefully observed, but the histories of the cases at the County Cook Hospital show quite plainly that many were either intentionally or carelessly diagnosed as inertia which in reality could not be so considered. Thus eleven of the cases under this heading were in the first stage ten hours or less, averaged two hours in the second stage, and from thirty minutes to three quarters of an hour in the third stage. When we remember that these cases were mostly primiparæ, it is evident that the diagnosis is incorrect and the forceps were unnecessarily applied in at least one third of the cases for this indication.

SLOW LABOR.

Under the heading "Slow Labor" (27 cases), we find the same conditions again, but not so frequent as under inertia uteri. One must strongly suspect that a large number of the cases (37) where no reason for the use of forceps was assigned could also be included in the same classification with the other two. The use of forceps under such circumstances were undoubtedly in cases of "schulzange" without the presence of the attending man, and this phase we will discuss later.

EXHAUSTION OF MOTHER

Maternal exhaustion is given as a cause in eight cases. This is a very elastic condition, especially if one relies upon the statements of the patient rather than on physical findings. If the woman is healthy and sound, and not exhausted by previous or existing diseases (primipara: typhoid, la grippe, or heart lesions, or hemorrhages), the pulse, respiration, temperature, conditions of the skin and digestive organs, will furnish the indications, but especially the duration of the labor, and, in particular, the second stage. Thus in a primipara the average duration of labor under normal conditions would be from 12 to 14 hours in the first, one and one half to three hours in the second, and possibly one hour in the third, while for an elderly primipara the first stage would average about two hours longer. For a multipara the first stage should be about ten hours, the second one to two hours, and the third from one half to one hour. There will be many normal cases that will vary from these figures in both directions, but, as a guide, the averages given are not far from correct.

MALPOSITIONS OF HEAD

Brow, face, and occipito-posterior positions account for 26 more, and these cases we are not in a position to criticise, if the diagnosis was correct. Under occipito-posterior as an indication, a number of cases of delayed labor legitimately belong which were classified otherwise.

DEEP TRANSVERSE ARREST OF HEAD

Deep transverse arrest of head is given as a cause in 5 cases, in 3 of which the second stage was respectively $1\frac{3}{4}$, 2, and 2 hours, which, in the absence of other complications, is certainly a hasty resort to forceps.

ECLAMPSIA

Eclampsia in eight cases we cannot impugn. This disease threatens the life of the child as well as that of the mother, and becomes a double indication for rapid dilatation followed by either forceps or version.

PELVIC CONTRACTION

Not of itself an indication for forceps, but the contrary, since the molding of the head occurs under the influence of the pains, and, though tedious, is frequently satisfactory. But since the contracted pelvis causes great crushing of the soft parts, and serious jamming together of the fœtal skull, it is sometimes, and not infrequently, necessary to apply forceps in behalf of the child, in spite of the pelvic contraction, as soon as the conditions for forceps are fulfilled.

ANTEPARTUM HEMORRHAGE

Gave the indication for forceps in one instance. This was probably a premature detachment of the normally implanted placenta, and is extremely rare as a reason for forceps. Both mother and child lived in this instance.

PROLAPSE OF CORD

In one of the two cases the child was dead, and forceps were definitely contra-indicated, as the case should be either left to nature or craniotomy done. In the second instance the child lived and the treatment was definitely correct under the usual conditions.

PROLAPSE OF AN ARM

This, in the absence of complications, is not an indication for forceps. If the head has engaged with the arm, let it alone. There is room in the pelvis for both. If not engaged, arm can be pushed back and head pushed into pelvis from above, or version can be done.

DEAD FŒTUS

Is never an indication for forceps. If any interference is required,it should be craniotomy. In one instance the forceps was evidently applied to the breech, although the foot was prolapsed. The child died. The forceps should never be applied to the breech of the living child. Among the other indications given, some follow naturally, the history of the case, and some do not; the latter, amounting to 17, are apparently not justified, and should be grouped together as further examples of "schulzange," or practice cases for the self-instruction of the internes. The dangers of the forceps operation are repeatedly described to the students, the indications and conditions for their use are gone over again and again, but instead of inspiring them with a desire to work according to the rules, many seem to feel that the technique of such operations must be acquired in the hospital, whatever the cost to the living adult.

Erroneous ideas and incorrect principles of practice will inevitably be produced by such procedures. Two or three applications of the forceps which may be undertaken on the living adult are by no means sufficient to produce a good technique, while, on the contrary, considerable skill can be obtained by doing the operation frequently on the manikin, hence as a means of instruction, the manikin is superior. All obstetricians agree that, even in the hands of an experienced man, the forceps is not a harmless instrument; and why should a man learn the value of asepsis and the importance of making internal examinations as infrequently as possible if he disregards the greater law and operates on an insufficient indication?

The effect on the operator is bad, and the act is unjust and dangerous to the patient. The practice is pernicious, and as a means of instruction illusory.

In this connection, it is suggested that the purchase of a manikin by the hospital might be a means of preventing some of these attacks, as some men enter the interne service who have never had this course. Another point that is valid is this: that if clinics were allowed in the obstetrical service, these cases would be more carefully studied and criticised, and forceps used much less frequently. It is important to consider the consequences which have followed this excessive devotion to instrumental deliveries, this obstetric *juror operativus*. Of the minor injuries, we find reported 111 lacerations, more or less extensive, which is 60 per cent of the total number delivered. This percentage, estimated for multiparæ and primiparæ together, is twice the average for primiparæ alone. More in detail,

we find that in multiparæ (34.5 per cent) and in primiparæ (66 per cent) each exhibits about twice the normal average percentage. In three of these cases the tears were complete, and one required nine rectal sutures.

Without counting the fourteen mothers who were transferred to the surgical wards for sepsis and other complications, of whom some undoubtedly died, we find a mortality of eleven mothers (.6 per cent) in the obstetrical service.

The normal mortality in forceps cases is given by von Winckel as .31 per cent, so that our average is again double what it might be, and nearly three times the average in normal deliveries (.25 per cent, von Winckel).

The mor.ality for the child in forceps cases is given by the same authority as 9.8 per cent, while in our series the figure is 17 per cent.

In general, it can be said that. theoretically, the only indication for the use of forceps is in the presence of danger to the life of mother or child, and this must be kept in mind before exceptions are allowed to come in. The most frequent danger to the latter is the disturbance of the intrauterine circulation, as shown by the fœtal heart tones going above 160, below 100, becoming irregular, or showing a variation of at least 50 beats to the minute.

The results of this investigation show that the indications for forceps at Cook County Hospital should be far more strictly considered, and certainly if they were, these cases would be more instructive than if forceps were hastily applied, while, in addition, the rights of the mother and child would be far more carefully safeguarded. It is necessary to state here, in extenuation, that the present obstetrical staff has only been on duty about one year, and, owing to the uncertain situation as to term of office, little has hitherto been attempted in regard to reorganization of this somewhat demoralized department. It must also be stated that the responsibility must be divided among the three schools, Regular, Homeopathic, and Eclectic, which practice at the hospital, the history sheets being so arranged that separation was imposeible- It is very probable if clinics were held regularly, and the department made responsible, that more of the serious cases which require expert attention would be sent into the service instead of being operated upon by the inexpert under septic and otherwise unsatisfactory conditions outside of the hospital.

THE DIAGNOSIS OF SURGICAL LESIONS OF THE KIDNEY

By CHARLES D. LOCKWOOD, M.D., LOS ANGELES, CALIFORNIA
Interne Cook County Hospital, 1898

THE affections of the kidney which are most commonly overlooked are: Renal calculus, septic infection, pyelitis, and tuberculosis. While these conditions are relatively uncommon in the aggregate, they contitute a good percentage of obscure cases, as my own records and those of other careful men will show. In the majority of these cases, attention is not directed by the patient to the true source of his trouble, and it is only by keeping these conditions in mind, and by routine examinations for them, that correct diagnoses are made.

METHODS OF DIAGNOSIS

1. Careful history-taking. In our enthusiasm for the newer diagnostic resources we forget the older and well-tried methods.

2. The second diagnostic measure of value is the physical examination.

A surgical affection of the kidney will rarely fail to reveal itself to skillful palpation. Israel was the first to emphasize the great importance of this procedure, and taught us how best to practice it. Tenderness on pressure, tumefaction, pain referred to the groin and penis during palpation, and soreness for several days

after, are the important facts bearing upon diagnosis.

The next step in the diagnosis of a suspected kidney lesion is the urinalysis. Both a twenty-four-hour and a catheterized specimen should be secured. The former will be used for the ordinary qualitative and quantitative tests; the latter, for microscopic and bacterialogic investigation.

Microscopic examination of the thoroughly centrifuged urine is of the greatest importance, for it rarely fails to clarify the diagnosis. It will reveal, in many cases, not only the nature of the kidney lesion, but also its location.

The urine from a kidney containing calculi presents a very characteristic microscopic picture, and will at once suggest the correct diagnosis. If the urine is examined soon after the passage of a renal calculus, there will be found a few red blood-corpuscles, many different forms of uric acid, gravel and a few kidney epithelia.

If the calculus has rested longer in the kidney or its pelvis, the masses of uric acid gravel will be more abundant, there will be many epithelia from the pelvis of the kidney, and pus-cells. Connective tissue shreds are never absent, and clinging to them will often be seen strings of fibrin.

In acute suppurative nephritis or septic infection of the kidney, the clinical symptoms are often so vague that a positive diagnosis is possible only through microscopic examination of the urinary sediment.

The microscopic features are: An enormous number of pus-cells, many kidney epithelia, red blood-corpuscles, especially abundant in acute abscesses, and connective tissue, showing destruction of kidney structure.

The diagnosis of tubercular kidney can be made positively only when tubercle bacilli are found in the catheterized specimen. Repeated examination of the thoroughly centrifuged urine will seldom fail to show the bacilli.

Sarcoma of the kidney can be positively diagnosed by microscopic examination of the urine, as was first shown by Heitzman in 1888. The characteristic features are small, globular, coarsely granular, glistening and at times homogeneous corpuscles, without nuclei, sharply defined contours, intermediate in size between blood-corpuscles and pus-cells. These are the so-called sarcoma corpuscles, and when found together with very large connective tissue shreds, the diagnosis of sarcoma is justified, if there is a palpable tumor of the kidney.

When the measures already enumerated point to a surgical lesion of the kidney, the next step should be to secure an X-ray photograph.

The radiograph should include both sides, for the symptoms are often referred to the sound side, and, moreover, in about fifty per cent of nephrolithiasis cases the calculi are bilateral.

Every kidney should be radiographed before any operation is attempted which involves injury to the parenchyma. If this rule is followed, much valuable information, otherwise impossible, will be attained and disastrous results occasionally averted.

The X-ray will prove of value not alone in the diagnosis of stone, but also in determining the presence of pus.

The reliability of the X-ray in the detection of renal calculi can no longer be questioned. Leonard has reported 320 cases, with less than three per cent of discovered error.

His cases have also established the reliability of the X-ray in making a negative diagnosis.

The well-taken X-ray picture establishes not alone the mere presence or absence of a stone, but also facilitates operation by guiding the exploring finger directly to the calculus, renders operation much more thorough by indicating *all* stones present, and diminishes trauma by preventing aimless search for foreign bodies.

X-ray plates should be large enough to include both kidneys, and the ureters above the pelvic brim. Ureteral calculi will be found lodged in some portion of the ureter in fully thirty-three per cent of cases.

Thus far our diagnostic procedures have established only the fact of a kidney lesion, with no attempt at differentiation or estimation of functional activity.

Our next step is to determine whether one or both kidneys are involved, and the functional activity of each.

This necessitates the use of the ureteral catheter, or some form of segregator which will collect the urine from either kidney separately. Undoubtedly, the catheterizing cystoscope is the most accurate, and in many cases the *only* accurate, means of differentiation, but its em-

ployment requires much skill and patience, and this few men have the time or opportunity to acquire.

We have in the Harris segregator and the Luys urinary separator, instruments which are practical substitutes for the ureteral catheter in the majority of cases, and their employment is practicable for men of average skill.

If the observation cystoscope is employed as a preliminary to segregation, the bladder, as a source of error, can be eliminated, and the *data* is then at hand for accurate conclusions.

Albarran of Paris, and other genito-urinary surgeons who have acquired skill in ureteral catheterization, are unwilling to admit the value of the segregator as a substitute for catheterization, but Luys, the inventor of the urinary separator, and Harris of this country, have furnished indubitable evidence in over two hundred cases of the absolute accuracy of their findings with the segregator.

I myself have employed the segregator in fifty cases with satisfactory results, confirmed by operation or subsequent events in the great majority of cases.

Doubtful and specially difficult cases should be subjected to ureteral catheterization, but, on the other hand, the segregator will yield eminently satisfactory results in many cases, where catheterization is impossible or contra-indicated.

Separation of the urine is coming to have a wider field of usefulness than was at first anticipated. It has been found that nephritis is often a unilateral affection, and a much more favorable diagnosis can be given when the degenerative process is limited to one kidney.

The estimation of the functional activity of either kindey comes next in our diagnostic scheme. This phase of diagnosis cannot be too seriously considered when operative interference is contemplated.

It is time to have done with indiscriminate operations upon the kidney without previous careful estimation of functional activity.

Operations upon the kidneys are still too commonly reported, often accompanied by post-mortem specimens, when no effort has been made to estimate the functionating power prior to operation.

Recent investigations by Albarran, Kapsammer, and others go to show that both kidneys do not perform equal functions, even in a normal individual; nevertheless we can determine with sufficient accuracy the functionating power of either kidney to serve as a safe basis in operative work.

Of the various methods suggested for estimating functional activity, the following are worthy of mention:

1. Determination of urea output from either kidney for a definite period of time.

2. Quantitative estimation of sugar excreted for a definite period of time after the injection of phloridzin.

3. Measurement of time required after the exhibition of methylene blue until its appearance in the urine. The permeability of the kidneys to this drug is of some value in estimating functional activity, as pointed out by Lepine and Patoir, French investigators. It is not to be relied upon, however, as an index to the permeability of the kidneys to normal constituents, although it bears a fairly constant relation to renal elimination.

4. Voelker and Joseph recommend indigo-carmine as an index to renal activity. A four-per-cent solution, in normal salt solution, is injected into the gluteal muscles. The time of its appearance at either ureteral orifice is observed through the cystoscope.

The maximum excretion occurs thirty minutes after the injection. Delay in its appearance at either orifice indicates a corresponding degree of inactivity on the part of the kidney.

5. Cryoscopy, or the freezing-point of the urine as compared with the freezing-point of the blood in the individual under observation.

This method has been elaborated by Koranyi and Kümmel, a German surgeon. The latter reported twenty-four cases to the Congress of German Surgeons, showing the value of this method in estimating the safety of kidney operations. Later observers have not confirmed the earlier observations, although the method undoubtedly has value when properly carried out.

It requires special apparatus and manipulation, which, as yet, are impractical for the average man.

The relative value of the different methods of estimating renal activity cannot be definitely

stated at this time, as too few observations have been made to justify definite conclusions.

Casper and Richter lay greatest stress upon the careful estimation of the following factors:

1. Quantity of urea excretion.
2. Amount of sugar excretion after the injection of phloridzin.
3. Cryoscopy.

They express the utmost confidence in conclusions based upon these findings.

I have had considerable experience with the phloridzin test, and have found it a very reliable index to renal activity.

The results have been remarkably uniform, and my confidence has grown with each trial. One half-hour before ureteral catheterization or segregation is begun 2 mg. of phloridzin is injected deeply into the lumbar muscles.

I have found in my experiments that the normal kidney, after injection of the quantity named, execretes sugar for from one to two hours at the rate of about 42 hundredths of 1 per cent per cubic centimeter. The diseased kidney will vary from this standard in proportion to the pathological changes in it.

A THIRD OVARY[1]

By W. P. MANTON M. D.

Professor of Obstetrics in the Detroit College of Medicine; Gynecologist to Hope Hospital; the Eastern and Northern Michigan Asylums for the Insane; President Medical Board Woman's Hospital and Infants' Home, etc.

IT has long been known that, as the result of some parsimonious whim, nature may withhold the formation of one ovary, and very exceptionally fail to produce the normal two. For some unexplained reason, however, there appears to be a reluctance to acknowledge that, in a more prodigal or frolicsome mood, nature may, on the other hand, exceed the normal limit, exhibit contempt for inhibitory mandates, and furnish more than the usual complement. A well-known English pathologist and surgeon says that "there is no authentic instance on record of a third ovary," and "an accessory ovary quite separated from the main gland, so as to form a distinct organ, has yet to be described by a competent observer." (1.) Another writer, in his work on gynecological pathology, says that "supernumerary ovaries do not occur" (2); while a former prominent teacher and professor of gynecology in one of our leading universities avers that "it is very doubtful if a true accessory ovary has ever been found. Abdominal surgeons have had opportunity of examining thousands of ovaries at operations, and yet I know of no one who has yet come across a third ovary." (3.)

In spite of these assertions, however, medical literature within the past few years has contained the reports by competent observers of a number of instances of the "mysterious third ovary," so that up to 1900 Seitz (4) was able to collect five, and possibly six, instances of the condition, associated with extra Fallopian tubes. The observations by men like von Winckel, Keppler, and others cannot be doubted as to their accuracy. It must therefore be admitted that while of extremely rare occurrence, a third ovary is occasionally met with; and it is quite possible that to its presence some of the untoward and disagreeable symptoms which arise following supposedly complete salpingo-oöphorectomy may occasionally be traced.

Seitz (loc. cit.), following von Winckel and Engstrom, classifies these superfluous structures into *supernumerary* ovaries—or those which are independent of but of equal importance to the normal paired organs—and *accessory* ovaries—those which have been separated off from the paired ovaries as the result of secondary influences during fœtal or post-fœtal existence. In the first variety the origin of the supernumerary organ is to be traced to early embryonic life when the sexual glands are differentiating from the urogenital ridge; while in the latter variety the condition is due to a division of the original ovary as the result of

[1] Read before the American Gynecological Society, May, 1905

some disturbance, frequently a peritonitis or inflammatory state, arising during fœtal or post-fœtal life. Accessory ovaries may be either intraperitoneal or retroperitoneal, the former being apparently of more frequent occurrence. The reported instances of retroperitoneal accessory ovaries or isolated portions of ovarian tissue show that these are placed oftenest between the layers of the broad ligaments, but occasionally, as exemplified by tumors containing ovarian structure, they are met with under the peritoneum of the posterior pelvic wall or behind that of the abdominal parietes. Up to the present time no instance of normal accessory ovary or ovarian tissue in these latter locations has been recorded; in every instance degenerative processes having taken place when the adventitious organ was discovered. In explanation of this, it may be said that so small a body as the ovary in such positions as those mentioned would hardly be recognized until attention is directed to its presence through the symptoms arising from pathological changes.

The following case of third ovary, now added to the list, belongs to the rarer second form.

On June 28, 1902, I performed multiple operations on Mrs. C. E. Besides plastic work, these included appendectomy, total ablation of the left appendages, and resection of the right ovary, which was largely cystic. At this time there was no indication of any abnormality which could be detected by careful physical examination, although the symptom—severe backache—which subsequently led to the discovery of a third ovary was present. The patient had always menstruated irregularly (three to seven week intervals); the discharge was scanty and lasted four days. Pain was always experienced from several hours to a week before the onset of the flow, and there was a "hard spell"—*petit mal*, from which the patient suffered—two weeks before. The patient made a satisfactory recovery, and was considerably benefited by the operations. There can be no question as to the total removal of the left appendages, as the specimen was carefully preserved and afterwards submitted to microscopical examination.

In October of the same year the patient rec turned, complaining of pain in the right iliaregion, and a more severe backache than ever. Examination revealed that the remnants of the right resected ovary had undergone degeneration and now presented a cyst the size of a hen's egg. Behind the uterus, buried in the tissues of the cervico-vaginal junction and *distinctly below the peritoneum* a small mass the size of a large filbert could be outlined. Pressure on this growth caused severe pain, and was indicated by the patient as "the spot." The ovarian cyst and the cervico-vaginal node were removed by vaginal section. The latter consisted of a mass of somewhat friable tissue rather more than an inch long by three quarters of an inch in thickness. The patient made a good recovery. The symptoms were largely, but not wholly, relieved by the second operations, and for a time the convulsions were held in abeyance. Menstruation continued as usual until January, 1903, when a period of six months was skipped, the flow returning twice during the following July. Subsequent to this there had been no further attempt at menstruation up to the time when my last note was made, November 12th.

The specimen removed from the cerevicovaginal junction was submitted to Dr. Heneage Gibbes for examination. His report is as follows:

"*Postcervical Cyst.* The stroma of this specimen was ovarian, and gave a healthy reaction to the stain. It contained a few Graafian follicles which had degenerated in their contents. The specimen had two varieties of cysts,—one, the ordinary dilatation of the Graafian follicles, the other having very irregular walls, with acute inflammatory changes in the lining membrane. The stroma did not appear to be affected by this. There were numerous areas of hyaline degeneration, and some of this change had also taken place in the walls of the blood-vessels. The acute changes in the cyst would probably account for the pain experienced."

BIBLIOGRAPHY

1. Bland Sutton. Surgical Diseases of the Ovaries and Fallopian Tubes, 1891, pp. 23, 482.
2. Roberts. Outlines of Gynecological Pathology and Morbid Anatomy, 1901, p. 197.
3. Penrose. A Text-book of Diseases of Women, 1900, p. 325.
4. Ludwig Seitz. Uberzählige und Accessorische Ovarien, Klinischer Vortäge, No. 286, 1900.

COOK COUNTY HOSPITAL

Department of Surgery

TUMORS OF THE PAROTID IN CHILDREN[1]

By C. G. GRULEE, A. M., M. D.

Instructor in Pediatrics, Northwestern University Medical School; Attendant Pediatrician, Provident Hospital, Chicago
Interne Cook County Hospital, 1905

I. Case of Angioma of the Parotid Gland

THE general attention which tumors of the parotid gland have attracted in the past few years and the extreme rarity of the affection in children lend value to any complete report of this disease which may be made. For these reasons the following case was thought worthy of study.

Myrtle M., 11 months old, entered the children's surgical ward of Cook County Hospital, December 6, 1904, on the service of Dr. Davison. The parents of the child were alive and well. So far as could be ascertained, the labor had been normal and the child had never been sick. Bottle-fed baby. At the time of birth there was noticed on the left side of the face, just anterior to the ramus of the lower jaw, two red spots (nævi). When the child was one month old the mother first noticed a swelling just beneath these spots. This swelling had grown gradually, but had never been painful or pulsated. On entering the hospital the child presented a regular tumor mass situated just below the lobe of the left ear and extending downward as far as the angle of the jaw and forward about 1½ inches anterior to the ramus. The skin over the mass was of a bluish color, and freely movable over the tumor, except at its center, where were seen the two nævi noticed by the mother. These nævi were two small, irregular, bright red areas lying in the skin immediately over the center of the tumor. On palpation the tumor mass is soft, rather regularly outlined, and feels somewhat lobulated. No pulsation. Diagnosis, angiosarcoma of the parotid region.

Operation, December 7, 1904. Operator, Dr. Davison; assistants, Drs. Grulee and Morrell, anæsthetic; Dr. Rendleman, chloroform. Incision 2½ inches long over the tumor mass, parallel to the lower border of the jaw and a little above it. Spindle-shaped area of skin about the two nævi included in the incision. Tumor mass enucleated by blunt dissection, and hemorrhage stopped by pressure. Drain of several strands of silkworm gut. Two silkworm-gut tension sutures. Wound closed by subcuticular horsehair suture. During the night following the operation the child loosened the dressings and the silkworm-gut drain came out. The wound, however, remained clean, and the child was dismissed on the morning of December 13th, the wound having completely healed by primary intention. In spite of numerous efforts, further knowledge of the case could not be obtained.

In removing the mass it was seen to have a thin connective tissue capsule which was continuous with the fascia investing the parotid gland. The nævi in the skin were directly continuous with the tumor mass. The mass itself was the size of a small nut, lobulated, and both in external appearance and on section was not unlike the tissue of the parotid gland. Microscopically, the skin over the nævus is normal, and the nævus itself has the characteristic appearance. The portion of the tumor just beneath the nævi and directly continuous with them shows a collection of many blood-vessels, some lined only by a layer of endothelium, while other have walls characteristic of smaller blood-vessels. The stroma of this tumor consists of connective tissue-cells with oblong or club-shaped nuclei compact in structure. The protoplasm of these cells is fairly abundant. Here and there are seen cells in which the protoplasm is not so abundant, and the nuclei are round and poor in chromatine. No karyokinetic figures seen. Sections from the central portion of the tumor show essentially the same structure, except that the stroma is so rich that a diagnosis of sarcoma was at first made. The tumor throughout is divided into lobules by thin bands of dense connective tissue. In that portion of the tumor where the stroma is most abundant are seen large dilated blood-vessels with extremely thick walls entirely surrounded by the stroma of the tumor. A section from the deepest portion of the tumor mass gives a picture which combines that of the superficial and of the central portions of the tumor, but, in addition, shows glandular tubules lined with a single layer of cuboidal epithelium, some cut longitudinally and some transversely. Less often one sees portions of what appears to be collections of parotid cells entirely surrounded by the stroma of the tumor.

The diagnosis of angioma involving the parotid gland was made for the following reasons: 1. An angiomatous structure was distinctly present in all parts of the tumor. 2. The cell masses are not sarcomatous, but are an excessive stroma, as is shown by the character of the cells and the presence of thick-walled blood-vessels. 3. Parotid gland is involved, as is shown by the tubules and epithelial cell masses in the deepest portions of the tumor.

[1] From the wards of Cook County Hospital.

Tumors of the parotid gland are exceedingly rare in children. Of 372 cases of parotid tumors collected by Degen,[1] only 13 occurred in children under 10 years old. I have been able to collect from literature (including the case here reported) 27 cases. Of these, 13, or nearly half, are angiomas. Of the other 14, 3 are sarcomas, 2 enchondromas, 2 echinococcus cysts, and one each of adenoma, congenital cystadenoma, congenital lipoadenoma, salivary cyst, and rhabdomyoma. Of these tumors, the aginoma is the only one which occurs with sufficient frequency to merit detailed consideration. The case histories only of the other tumors will be given.

A. Angioma

This is the most common form of tumor of the parotid gland in children, and is doubly interesting, because of the various controversies on the endotheliomata of this gland, on which subject the relatively frequent occurrence of the angioma in children may have some bearing.

This variety of tumor is thought to be of congenital origin. Of the 13 cases, 11 were either first seen by the observer in the first year of life or gave a definite history of first appearance during that time. So far as can be gleaned from the case reports, there are no predisposing factors. Ten of the 13 cases occurred in girls.

Pathology.—The tumor, always unilateral (8 of the 11 on the left side), may be a simple or a cavernous angioma. The simple type is much more frequent. In one of von Mangoldt's cases, a boy of 4 months, the tumor was the size of a fist, while in Boeckel's case it was as large as a hen's egg. However, in most of the reports the mass was about the size of a nut. The tumor is nearly always irregularly round and of a soft consistency. The mass is usually surrounded by a connective tissue capsule, and has a distinctly glandular appearance, both externally and on section. Microscopically, there are present the characteristics of an angioma. In at least one other case—von Mangoldt (1)—than the one here reported, the stroma was so thick as to suggest the possibility of an angiosarcoma. Characteristic is the presence of tubules or portions of the gland substance of the parotid. The presence of nævi in the skin over the tumor is reported in 6 of 13 cases, and would seem in some cases (notably the one here reported) to have some direct connection with the tumor mass. In one of von Mangoldt's cases there was also a nævus on the lower lip.

Symptoms.—In none of the cases reported has the general health of the child been impaired, nor has there been any local disturbance, aside from that caused by the bulk of the tumor. No symptoms referable to the parotid, such as salivation or facial paralysis, were noted.

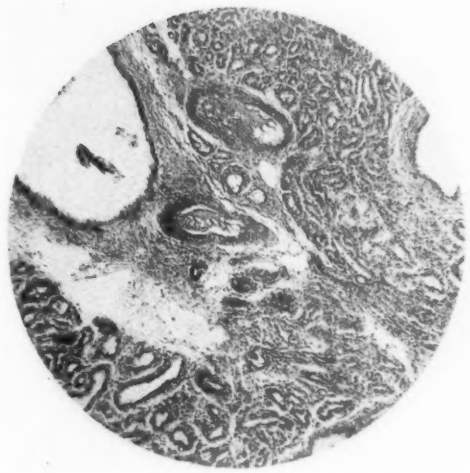
As to the tumor itself, it was always unilateral, and rarely large. Its consistency was soft, usually about the same as that of the parotid gland. In most cases the mass was compressible, and in a few entirely reducible. Pulsation was noticed in but one (Tuffier) of the cases. A symptom quite frequently observed was the bulging of the mass when the child cried. The skin over the tumor, as a rule, moved freely and was of a bluish tint, suggesting the presence of blood-vessels close to the surface. The frequent association of this tumor with nævi in the overlying skin is worthy of notice. As a rule, the growth was quite rapid.

Diagnosis.—The principal points in the diagnosis of this tumor are the characteristics of the tumor mass as above enumerated, the absence of physical discomfort, and the age of the patient. Parotid hypertrophy is rarely found in infants, is bilateral, has no bluish tint, and is not compressible. Angiosarcoma is extremely rare in children. This fact, together with the cachexia and the local involvement, will usually serve to make a diagnosis. There may, however, be some confusion, even under the microscope.

Prognosis.—In none of the cases has the future course of the patient been observed, so that it is impossible to state whether the tumor returned or not.

Treatment.—Compression was tried in several cases, with but little result, the tumor reappearing as soon as the pressure was removed. Only in the case of Pilcher was this

[1] Degen Inaug. Diss. Freiburg, 1900.



Microphotograph I. Section from peripheal portion of tumor, showing angiomatous structure. X 125.

method employed with any degree of success. Von Mangoldt tried electrolysis once without result. Tuffier, however, was successful with electropuncture, the tumor in his case yielding to this method after it had failed to disappear, following a ligature of the external carotid, and also after an irritant injection into the tumor substance. The Pacquelin cautery asw successful in two of von Mangoldt's cases. Boeckel passed long sutures through the tumor mass and brought about the disappearance of the tumor. Ligature of the external carotid did not produce the desired results in any case. The treatment of choice is undoubtedly the extirpation of the tumor. This is comparatively easy, since the mass is nearly always encapsulated, and the hemorrhage is not as great as one would expect when the character of the tumor is considered. In all the cases where this was tried (6 cases) the result was rgatifying. In three of these cases there was some interference with the action of the facial nerve, but in only one was the paralysis permanent.

Hartmann draws the following conclusions concerning angioma of the parotid gland.

1. There exists in the region of the parotid a variety of angioma which is confused by most observers with parotid hypertrophy.

2.. This angioma appears in the early years of life.

3. Angioma is unilateral and resembles a vascular hypertrophy.

4. Can come at advanced age.

5. Begins by dilatation of the existing capillaries, but may go on to cavernous formation.

6. Can become arterial or venous.

7. Treatment by electrolysis, extirpation, cautery, or ligature of the external carotid.

CASE REPORTS

A. Angioma

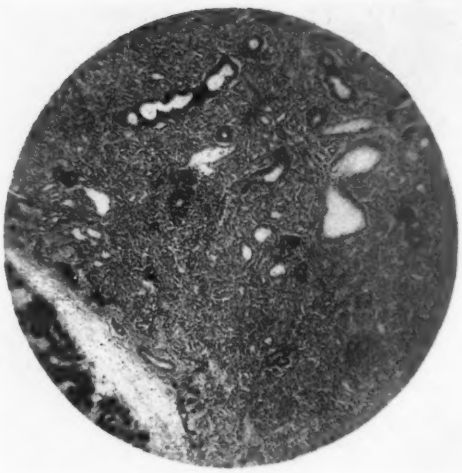
I. Pilcher, L. S.—Successful extirpation of erectile tumor of the parotid gland. (*Ann. New York Anat. and Surg. Soc.*, 1880, ii, 111.)

Female infant, 6 weeks old. At birth, presented a superficial scarlet nævus in front of and partly behind the left ear. At age of 6 weeks, left parotid region began to swell. After 2 weeks of slow growth, increase became rapid. Did not pulsate. Nearly disappeared under compression. Microscopical section shown.

II. Hartmann. (Contribution à l'étude des angiomes de la région parotidienne *Rev. de Chir.*, 1880, ix, 756 764.)

Girl, 18 months old. Tumor showed in left parotid region in the second month of life. Treated by electrolysis with favorable result. In the lowest part of the parotid region was a rounded, slightly elevated tumor, size of half a nut, markedly bluish in the center. Soft tumor of slow growth, partly reducible. Lies in

Microphotograph II. Section from central portion of tumor, showing sarcoma like stroma with a large, thick walled blood-vessel.



Microphotograph III. Section from deepest portion of tumor showing parotid tubules.

subcutaneous tissue, and can be moved over deep parts. Adherent to skin.

III. HARTMANN. (Ibid.)

Girl, 5½ months old. Tumor first appeared in the left parotid region when the child was six weeks old. Growth slow, but progressive. No discoloration of skin at first. When observed by author there was seen a general tumefaction in the left parotid region, 5 x 4 cm. Skin slightly bluish and veins prominent over mass. Soft, compressible pseudo-fluctuant. Skin moves over tumor, but tumor does not move over deep structures. No functional symptoms. Aspiration gave nothing. Incision over tumor showed a very vascular mass firmly attached to the deep tissues. Abundant hemorrhage. Recovery. No further knowledge of case.

Report on Specimen.—Lobulated, encapsulated on surface, but deeper; is continuous with parotid tissue. Many vessels and ecchymotic areas lying beneath capsule or between lobules.

Microscopically.—Capillaries and arterioles much dilated. Glandular substance pressed back and atrophied. Seemed to be a dilatation of the existing vessels, rather than a new formation of vessels. Capillaries somewhat irregular in their contour. Abundant hemorrhages, which had infiltrated the interlobular connective tissue. In the parts adjoining the tumor the tissue is normal, as are also the capillaries. Acini normal. In the diseased portions of acini, when they exist, are pressed together, cells are lower, excreting ducts have alone persisted and resisted atrophy.

IV. BOECKEL. (See *Hartmann.*)

Girl, 1 year old. Tumor size of hen's egg (9 x 7 cm.). Swelled when child cried, but did not pulsate. Cured by passing long sutures through it.

V. VON MANGOLDT. (Ueber Cavernome und telangiectatische Geschwülte der Parotis. *Jahresb. d. Gesellsch. f. Nat. u. Heikl. in Dresd.*, 1897–98, 60–62.)

Boy, 4 months old. Tumor of the right parotid gland, the size of a fist. Shows bluish through skin. Increases in size when child cries. Growth rapid. Extirpation at 4 months of age. Tumor extended to base of skull. Recovery with facial paralysis.

Microscopical Examination.—Some questions as to whether tumor is an anginoma or an angiosarcoma, with final decision in favor of former.

VI. VON MANGOLDT. (Ibid.)

Girl, 9 months old. Angioma of left parotid, also in skin over tumor. Removed by Pacquelin cautery. Death from gastroenteritis.

VII. VON MANGOLDT. (Ib'd.)

Boy, 7 months old. Angioma of left parotid, with angioma of skin. Removed with Pacquelin cautery. Wound unhealed at time of report.

VIII. VON MANGOLDT. (Ibid.)

Girl, 11 months old. Angioma of the left parotid, with angioma in the skin of that region, and also in the lower lip.

IX. VON MANGOLDT. (Ibid.)

Girl, 5 months old. Angioma of the left parotid. Rapid growth. Electrolytic treatment kept down the growth, but did not remove tumor. Extirpation. Facial nerve spared. Recovery.

X. GUELLIOT. (Tumeurs de la parotide. *Bull. Soc. de Méd. de Reims*, 1898, N.S., iv, 250–252.)

Girl, 7 years old. Tumor of right parotid. No change in color of skin nor dilatation of superficial blood-vessels. Non-mobile. Slightly compressible. Not painful. Grew to size of large nut. Removed pediculated tumor consisting of blood-vessels. Facial nerve temporarily affected. Recovery.

XI. TUFFIER. (Tumeurs arterielles pulsatilles de la parotide. *Bull. et mem. de la Soc. de Chir. de Paris*, 1905, xxxi, 349–353.)

Girl, 2½ years old. Tumor in parotid, size of small nut. Pulsatile, reduced by pressure and compression of parotid. Ligature of carotid did not reduce it. Injections of no avail. Complete reduction by electropuncture. Cured after 6 years. Only small scars.

XII. HARDOUIN. (Un cas d'angiome de la parotide. *Rev. de Méd.*, 1905, xxv, 206–213.)

In a child 5 months old. First noticed, when child was 4 months old, an irregularly circular tumor 7 cm. in diameter, in right parotid region. Tumor slightly bluish in posterior parts, and had a little irregular nævus in its center. Soft, hemogeneous, pseudo-fluctuant, easily compressed tumor, not adherent. Attempt at reduction not successful, but when child cried gave sensation of expansion. No pain on pressure. Movements of jaw free. General state of infant, excellent. Removal of tumor, with ligation of external carotid. Some paralysis of branches of facial nerve following operation.

Pathological Report.—Lobulated. Lobules separated by connective tissue bands. Felt and looked like a gland. *Microscopically:* Many capillaries. Endothe lium large, semicircular, and possess large nuclei, which occupy a large part of the cell. Walls of vessels thick.

Stroma of young connective tissue cells numerous. Mucous degeneration about large vessels. Here and there excretory tubes.

B. Sarcoma

I. Kauffman. (Das Parotis-Sarkoma, pathologish anatomisch und klinisch bearbeitet. *Arch f. klin. Chir.*, Berlin, 1881, xxxvi, 672–730.)

Boy, 10 years old. Round-cell sarcoma of the left parotid. Recurrence in several places, with death in two years after removal of original tumor.

II. Schuh. (See *Kauffman*, p. 687.)

Child, 5 months old. At birth, tumor of the parotid, the size of a walnut, which had grown to the size of a man's fist. Egg-shaped, movable, slight resistance, altogether painless, no disturbance of function. Gelatinous tumor surrounded by a thin connective tissue capsule. *Cross-section:* Slightly gray and rather elastic. *Microscopically:* A fibrosarcoma cells showed no order, nuclei large, cells stellate. Anastomosing network was here and there to be seen.

III. Sattler. (See *Kauffman*, p. 702.)

In a child 12 years old. Mother first noticed a tumor under the right ear 5 years before. This tumor contained hard, bone-like nodules. There was a tumor in the right parotid region, the size of a hen's egg, elastic, skin normal. Fibrous capsule. A myxochondrosarcoma with alveolar structure.

C. Enchondroma

I. Dolbeau. (Des tumeurs cartilagineuses de la parotide et de la région parotidienne. *Gaz. hebd. Med. et Chir.*, 1858, v, 687.)

Man, aged 42 years, had had a tumor in the right parotid region since he was 7 years old. When removed it was found to be an enchondroma.

II. Tillaux. (Du chondrome de la parotide. *Gaz. d. Hôp.*, 1885, lviii, 1129.)

In a 16-year-old girl, a tumor size of large Mandarin orange, in left parotid region. Left-sided otorrhœa. Tumor began at 7 years of age, in the form of a small ball, which could be rolled under the finger. Skin normal, and glides over tumor. Surface of tumor unequal and nodular. Firm uniform consistence, without elasticity. Tumor movable over deeper parts. Contraction of sternomastoid reduces size of tumor. No pain or inconvenience. Physical examination otherwise negative.

Microscopical Examination.—A pure enchondroma of the parotid gland which had undergone some mucous degeneration in places. Tumor had destroyed the normal glandular elements. The cells ramify in the tissue and are bound together by stellate prolongations.

D. Echinococcus Cysts

I. Ricchioni. (Cista idatigena della loggia parotidea. *Arch. ital. di pediat.*, 1890, viii, 274–278.)

Boy, 2 years old. Gradually growing tumor in left parotid. There had been a superficial abscess in this region, which had evacuated, which circumstance clouded the diagnosis. Rounded, fluctuating tumor the size of an orange. Skin inflamed, but moves over tumor. Very little pain. Puncture showed clear limpid fluid. Incision over tumor revealed the characteristic white opaque wall of an hydatid cyst. Section of cyst-wall showed lamellated appearance. Fluid evacuated and cavity filled with 1-1000 bichloride. Recovery in 10 days.

II. Piéchaud. (Kyste hydatique de la parotide chez un garçon de sept ans. *Arch. clin. de Bordeaux*, 1894, iii, 508–514.)

Boy, 7 years old. Tumor in the right parotid, the size of a small orange. Tumor had been noticed for 18 months. Pain in teeth of the affected side, slow growth, no alteration of the skin. A rounded fluctuating tumor giving all the evidence of a cyst. No pain on pressure, no facial paralysis, no disturbance of hearing, no disturbance of salivary secretion. Puncture gave clear cystic fluid containing 5 per cent Na. Cl. and hooklets. Second puncture removed 62 c.c., after which parotid and neighboring parts resumed their natural form, but the cyst slowly filled. Three weeks after the second puncture the child was taken down with measles, during the course of which disease the cyst disappeared and did not return.

E. Adenoma

Ersös. (Mittheilungen aus dem Pester Armen Kinderspitale. *Jahrb. f. Kinderheilk.*, 1883, N. F., xix, 318–345,.)

In a girl 9 months old there had been noticed for four months a tumor in the right parotid region. Painless. Slow growth. On examination there was seen a tumor the size of a large nut in the right parotid region. Skin normal color. Tumor feels hard and shows lobulated formation. Child died 2 weeks after admission. Microscopically, tumor consisted of lobules of parotid tissue surrounded by connective tissue. The chief mass of each of these lobules consisted of loops of blood-vessels with hypertrophied endothelium and perithelium, and at the periphery of the lobules were seen many fine vessels. In some lobules the glandular formation is more marked than is that of the blood-vessels. In these the tubules are sometimes filled with cylindrical epithelium and sometimes with smaller round and oval cells.

F. Lipoadenoma

Sacchi. (Di un rarissimo caso di lipoadenoma acinoso congenito della parotide. *Gaz. degli Osp.*, 1893, xiv, 627–629.)

Boy, 6 months old. Born with a large tumor in left parotid. Slow growth for the first four months after birth, after that rapid.

Examination.—Well-nourished child. In the region of the left parotid is a round tumor size of a child's head extending over the temporal, auricular, mastoid, and left carotid regions and covered by thin skin. Over the surface large tortuous veins. Ear small, rather rudimentary, and located immediately behind the anterior half of the tumor. External auditory meatus closed. Consistency of tumor hard and firm. Peripheral structures movable over tumor.

Operation.—Tumor just beneath the skin and sub-

cutaneous tissue in a fibrous capsule. Easily shelled out. Superficial adhesion to capsule and deep to parotid. Very little hemorrhage. No paralysis of facial nerve. Recovery in 20 days.

Specimen.—Irregularly round, rose-colored, mamellated, covered by thin adherent membrane, lobes divided by septa of fibrous tissue. Microscopically, composed of adipose tissue surrounded by septa of connective tissue, in some places thin and in others thick, in which run blood-vessels. Septa divided tumor into lobules of different sizes. In the midst of the adipose tissue are tubules and acini of various sizes. In some places tubules dividing dichotomously end in acini. Some tubules in septa. In the tubules was often granular material, in which were seen sometimes cells whose protoplasm and nuclei stained well.

Diagnosis.—Lipoadenoma acinosa of the parotid.

G. Cystadenoma

Von Saar. (Kongenitales Zystadenom der rechten parotis. *Prag. Med. Wchnscher.*, 1904, xxix, 675–677.)

Child 1½ years old, born with a swelling on the right side of the neck. Growth rapid. Reached behind to ligamentum nuchæ below to clavicle. Interfered somewhat with respiration. Fluctuated in lower part. Puncture showed turpid, bloody serous fluid. Tumor grew even after repeated aspirations with injection of 40 per cent alcohol. Arsenic and X-ray of no avail. Measles developed, followed by bronchitis, and death at 1½ years.

Autopsy showed a tumor of the right parotid pushing larynx and trachea to the left. Fibrous capsule. Section shows larger and smaller cysts.

Microscopically.—Capsule in places contained vessels, nerves, and non-striated muscle. Parotid lobules drawn out into thin layers through pressure. Here and there groups of cells can be distinguished, in the acini of which a lumen can be seen. Tumor mass consists of cysts and cell masses. Stroma is rich in intercellular substance. Ordinary blood-vessels are seen, and also large irregular blood spaces lined with a single layer of endothelium. Areas of necrosis. Large and small cystic spaces lined with flat, cuboidal, or cylindrical epithelium. Cyst space empty or filled with detritus and polymorphonuclear leucocytes. Inclosures of muscle, lymphadenoid tissue and cartilage.

Diagnosis. — Congenital cystadenoma of parotid gland.

H. Salivary Cyst

Bouchaud. (Kyste Salivaire de la parotide. *Gaz. d. Hôp.*, 1873, xlvi, 44.)

In a young girl, 9 or 10 years old, there has been present for more than a year a painless tumor on the right side. Tumor size of small egg, rounded, soft, fluctuant, and does not move over subjacent parts. Increases at time of mastication. Right side of mouth moister than left. Puncture with capillary trocar obtained clear, slightly yellow liquid, slightly viscous, and colored slightly reddish by a little dark blood. Tumor reduced after puncture, but reappeared in a few hours, when child began to eat. Attempt at the formation of internal salivary fistula failed. Fluid changed starch into glucose. Cyst became infected, opened externally, and finally healed without further treatment.

I. Rhabdomyoma

Prudden. (Rhabdomyoma of the Parotid Gland. *Amer. Jour. Med. Sci.*, 1883, cxi (lxxxv), 438.)

From boy of seven years was removed a small tumor from the parotid gland during an operation for osteomylitis of the jaw.

Specimen. — Lobulated tumor 5.7 x 3.8 x 3.2 cm. Two portions firmly united and merging without sharp demarkation into each other. Two thirds of the is firm and colored by a distinct connective tissue mass capsule. On cross-section shows tiny spheroidal or elongated bodies lighter in color than surrounding tissue and sharply outlined. Remaining one third has general appearance of the parotid gland. Microscopically, the smaller portion is a section of the parotid gland. Larger portion consists of connective tissue, in which are bundles of striated muscle fibers. Spheroidal cells closely packed together and closely surrounding an artery, the whole being sharply outlined. Some have a well-marked reticulum, while others contain tubular structures.

I wish to thank Dr. Charles Davison for permission to report the case and Dr. F. R. Zeit for his assistance in the microscopical diagnosis.

COOK COUNTY HOSPITAL

Department of Surgery

TUBERCULOSIS OF THE CERVICAL LYMPH-NODES[1]

By DANIEL N. EISENDRATH, A.B., M.D., CHICAGO

Adgt. Professor of Surgery, College of Physicians and Surgeons; Attending Surgeon Cook County Hospital; Interne Cook County, 1892

ALTHOUGH this subject would seem at first glance to be one with which every surgeon is thoroughly familiar, I feel that the progress made even in this subject during the past decade would warrant one in discussing it at the present time

Our knowledge of the etiology, diagnosis, and treatment of the condition has advanced so much that I will consider it chiefly from these standpoints.

ETIOLOGY

It has been known in a more or less empirical manner for many years that the tonsils were the most frequent portal of infection in tuberculosis of the cervical lymph-nodes. The more exact researches of recent times have demonstrated this beyond a doubt. In ten per cent of a large number of tonsils and adenoids removed during life, evidences of tuberculosis has been found. The majority of these examinations were tonsils and adenoids removed from children. If one considers that in many of these cases the tubercular lesion might have been healed at the time of operation, the percentage of cases in which tuberculosis was found is smaller than is actually the case.

Whether these foci are primary or secondary it is impossible to say during life, but it would be fair to assume that they are primary in many cases.

The best manner in which to explain the frequent involvement of the lymphoid tissue of the tonsils and pharynx, with transmission of the infection to the cervical lymph-nodes, is that young children inhale the dust which contains the bacilli in crawling about on the floor, and that they lodge in the tonsils. The organisms may remain latent in the cervical lymph-nodes for years and then suddenly start up actively.

Those who are interested will find an excellent review of the literature of the portals of infection in cervical lymph-node tuberculosis in the articles of Lartigau and Nicoll,[2] of Koplik,[3] and of Kingsford.[4]

This condition of tonsillar tuberculosis is, of course, most frequent in children, but may exist in adult life.

If I were to enumerate the various portals of entry according to their frequency, in tuberculosis of the cervical lymph-nodes (Fig. 1), I should say:

1. The faucial tonsils.
2. The pharyngeal tonsils or adenoids.
3. A tuberculosis of the temporal bone, with resultant otitis media.
4. Through carious teeth.
5. Tubercular lesions of the buccal and nasal mucous membranes.

Of these, the last-named is so rare that it may be left out of consideration. The third is so self-evident that its recognition clinically is easy. The fourth (carious teeth) form the atrium in a small proportion of cases.

I believe that we are most apt to overlook the importance of the first and second (tonsils and adenoids) of these atria in our treatment of tuberculous cervical lymph-nodes.

We can do much to prevent such a secondary condition, through the enforcement of the same principles as are applied in the prevention of pulmonary tuberculosis. These are referred to under the head of Treatment.

George B. Wood[5] has recently confirmed some of the above views by injecting colored fluid into the faucial tonsil. He found that it passed through the peritonsillar lymphatics into a node which he terms the tonsillar (one of

[2] American Jour. of Med. Sciences, vol. cxxiii, p. 1031.
[3] American Jour. of Med. Sciences, vol. cxxvii, p. 861.
[4] Lancet, vol. i, 1904.
[5] American Jour. of Med. Sciences, Aug., 1905.

[1] Read at the 1905 meeting of the Western Surgical and Gynecological Association.

the deep cervical group) situated in the angle between the internal and anterior jugular veins. (Fig. 1.)

Personally, I have made it a practice to have every case examined, if possible, before operation, by a specialist, as to the existence of diseased faucial tonsils complicated, or not, by the presence of adenoids.

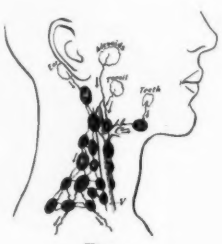


Fig. 1.

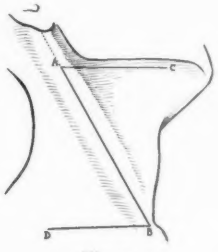


Fig. 2

Fig. 1. Portals of infection and the most frequent nodes involved in tuberculosis of the cervical lymph-nodes. The arrows show the direction of the efferent lymph-vessels leading from the various portals of infection toward the respective nodes which are first infected. *M*. Uppermost node of internal jugular vein which receives the infective material from the ear. *T*. Tonsillar gland located in angle of internal jugular and anterior jugular. This receives the lymph from the tonsil. From *J* downward are to be seen the principal lymph-nodes of the neck, which receive the lymph from the head and face. These are the internal jugular group lying beneath the sternoclidomastoid muscle, in close relation to the internal jugular vein *V*, and in direct connection with the lymph-nodes of the posterior triangle of the neck, *P*. *S*. Submaxillary nodes. These lie either upon or within the capsule of the submaxillary salivary gland, and receive the infective material from the teeth and jaws, but, in the author's opinion, may be infected by retrograde currents from the tonsillar lymph-nodes. *C*. Two nodes are shown with their short venous branch leading into the internal jugular. Attention is called in the text to this condition, under Operative Technique.

Fig. 2. Incisions employed in the extirpation of tubercular cervical lymph-nodes. The typical incision is from *A* to *B*, over the middle of the sternoclidomastoid. If it become necessary to make an extensive dissection of the submaxillary region, the incision extends from *A* to *C*. If a large exposure of the supraclavicular region be necessary, the incision is extended in the direction *B D*.

It may be of interest to relate an instructive experience in this connection. I operated upon a boy of ten for tubercular cervical nodes, without paying any attention to the condition of the upper respiratory tract. At the time of the first operation I considered that I had been very thorough in removing every palpable node with the surrounding fat. (I shall refer later to the importance of removing this fatty tissue.)

He returned one year later with almost as many enlarged nodes as at the time of the first operation. I advised and performed a second extirpation, combined with the removal of adenoids and enlarged tonsils. No recurrence has taken place up to the present time, about five years after the second operation.

I do not believe that sufficient attention has been paid to removing these primary atria, and at the present time do not consider an operation thorough, especially in children, without such an examination of the nose and throat. The removal of the tonsils and adenoids is now combined with the extirpation of the lymph-nodes as a more or less routine measure.

DIAGNOSIS

Our notion of tubercular enlargements of lymph-nodes has generally been that they occur in a chronic form only, and that the entire course of the disease was one which extended over a period of months to years. There seems to be no question that there are cases which run a very acute course, so that caseation occurs within two to three weeks after the onset of the disease. The following case illustrates this point:

During the past two or three winters we have had an epidemic, in Chicago, of acute enlargement of the cervical lymph-nodes on both sides of the neck, accompanied by rise of temperature and local inflammatory signs. In some of the cases the temperature would be persistently high, varying between 101–104° for a period of two to three weeks, so that one was often in doubt as to the possibility of suppuration having occurred. The majority of these cases are, no doubt, the result of an influenzal inflammation of the lymph-nodes; a disease which was described in 1899 by Pfeiffer as a complication of influenza, and called Pfeiffer's disease or glandular fever.

During the past and present winters I have had occasion to see a large number of these cases in consultation, and two of them have interested me greatly. In one, a schoolboy of fifteen had an acute bilateral enlargement, involving many of the internal jugular nodes. One of them showed distinct fluctuation about five weeks after the onset of the disease. I evactuated typical cheesy pus. A radical ex-

Fig. 3

Fig. 5

Fig. 4

Fig. 3. Distribution of enlarged lymph-nodes in the case of pseudoleukemic form of tubercular lymph-nodes. (See text.)

Fig. 4. The relation of tubercular glands of the neck to the sternoclidomastoid muscle. 1. Several large glands, which are fused together, lying in front of the muscle, extending as far forward as the angle of the jaw. The black area at the lower level of this mass indicates a sinus covered with tuberculous granulation tissue. 2. A similar mass situated in the upper portion of the posterior cervical or occipital triangle, between the upper ends of the sternoclidomastoid and trapezius muscles. The sterno-clidomastoid muscle usually lies superficial to such glandular masses, the latter being adherent to the deep vessels. 3. Mass of glands at lower portion of posterior cervical triangle (subclavian triangle). The black area at the center of this mass is a sinus similar to the one in relation to the other glands. 4. Outlines of sternoclidomastoid muscle.

Fig. 5. Drooping of right side of neck as a result of paralysis of the trapezius muscle, following severing of the spinal accessory nerve.

tirpation of the nodes was undertaken, and revealed the presence of a very extensive involvement of many nodes along the internal jugular. This case had begun acutely, unlike a tubercular form, with a temperature of 102°, and all of the signs of the ordinary Pfeiffer fever.

I saw a second case in a lady of thirty, with caseation of the glands in three weeks. In neither of the cases was there any history of previous tubercular disease in the patients themselves, or in the family. The glands were from the first much harder than in Pfeiffer's disease.

There is another condition which must be considered in the differential diagnosis.

These are cases to which Fischer has called attention, and termed the pseudoleukemic form of tubercular lymph-nodes. There is not only an enlargement of the cervical nodes, but of the axillary and inguinal as well. The enlargement takes place gradually, and there is no tendency to softening, as in ordinary tuberculous nodes, or to the formation of adhesions between the adjacent ones.

The entire clinical picture resembles greatly that of Hodgkin's disease, but differs from it in the fact that the enlargement of the nodes is not as progressive as in psuedoleukemia, and rarely reaches the enormous size of the latter, nor is there any involvement of the mediastinal nodes. Fig. 3 illustrates this variety of enlargement, whose exact nature is not quite clear. In one of these patients a number of typical tubercular nodes were extirpated on the left side of the neck, three years ago. About one year after the wound had been healed, the patient presented himself on account of a recurrent enlargement of the nodes on both sides of the neck and in the axillæ. The examination showed a condition which it was practically impossible to differentiate from an incipient Hodgkin's disease, and if it had not been for the absolutely re-

liable history obtained, it would have been impossible to make a diagnosis.

In the second case the enlargement of the lymph-nodes was very marked on both sides of the neck and in the axillæ, as well as in the inguinal region. In this case, three years before, Dr. A. E. Halstead had removed a large number of typical tubercular nodes. There has been no tendency to breaking down, and under the influence of the X-ray a very marked improvement has occurred.

I have referred to these acute and pseudo-leukemic forms in order that further observations may be made. I need mention only briefly the other forms of lymph-node enlargements from which the tubercular must be differentiated. They are the true Hodgkin's or pseudoleukemic, the syphilitic, lymphatic leukemia, chronic non-tubercular hyperplastic nodes, lymphosarcoma, and secondary carcinomatous.

TREATMENT

Prophylactic.—We can accomplish much by educating the masses in the knowledge of the general principles of hygiene. Those suffering from pulmonary tuberculosis must be cautioned not to expectorate on floors or public conveyances, since the pulverized sputum is often first arrested in the tonsils and other lymphoid tissue of children and young adults. Both poor and rich must be taught the necessity of cleanliness in the modern sense of the word. A free circulation of air in living, and especially in sleeping, apartments will do much to keep the tonsillar ring in a good eliminating condition. I am firmly of the opinion that we can accomplish good through early and radical removal of diseased tonsils, and of adenoids when found, since these are the most frequent atria of infection.

Non-operative Treatment.—If an operation is deemed inadvisable or is objected to, the ideal treatment is to send the patients to the mountains or to the seashore. If it is found impossible to follow such a plan, the use of tonics — cod-liver oil, guaiacol, iodide of iron — is of aid, provided that the process is not a very active one. If the latter exists, no medical treatment will be of much avail. I do not believe that the external use of iodine is of any benefit. In regard to the X-ray, I am frank in saying that my experience does not warrant an expression of opinion.

Operative Treatment.—A study of the statistics of various authors will convince one that a thorough and radical extirpation of every enlarged tuberculous node will not only give the best prospect of immediate immunity, but also of freedom of development of foci in the lungs, bones, peritoneum, kidney, and testis at some period in the future.

What do statistics of operative interference show?

In 745 cases collected by Blos from eleven sources, over 54 per cent showed permanent recovery. Six years was regarded as ample time after operation to be considered a permanent result. Of 140 cases collected by Jordan, 20 showed involvement of the lung before operation, and at a later examination 16 of these were well and free from pulmonary disease. Of the 58 cases (out of a total of 143 operated) collected by Mitchell, 45, or 77.6 per cent were well, with no local or other recurrence, and with negative lungs, after periods varying from one to thirteen years).

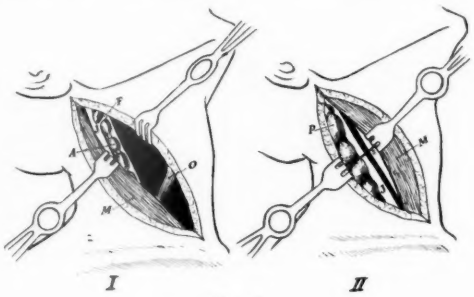


Fig. 6

Fig. 6. I. Exposure of internal jugular lymph-nodes *A*, in upper half of neck, by retraction of the sternoclidomastoid muscle; *M* upwards. *F*. Anterior jugular vein. *J*. Internal jugular vein. The lymph-nodes are shown attached both to the carotid artery (shown in white) and to the internal jugular vein. *O*. Omohyoid muscle. II. Exposure of lymph-nodes in posterior triangle by retraction of sternoclidomastoid muscle (*M*) forwards. *S*. This latter is placed just below the point of emergence of the spinal accessory nerve from the middle of the muscle. *J*. Internal jugular vein, to which a large number of lymph-nodes are shown adherent.

I agree with the opinion of Dowd,[1] that if the nodes are thoroughly extirpated there is

[1] Annals of Surgery, July, 1905.

no recurrence in 75 per cent of the cases, and ultimate recovery in 90 per cent. Both of these can be even increased by the systematic removal of the tonsils and adenoids at the time of the lymph-node extirpation.

Method of Extirpation. — I will describe briefly the method uniformly employed in 50 cases. If tonsils or adenoids are to be removed, this operation is performed after the extirpation of the nodes, in order not to infect the field of operation.

The patient lies flat upon his or her back, the shoulders are raised by a small sandbag so that the head falls back. The chin is turned to the side opposite to that upon which the incision is to be made.

Of all the different forms of incision, I prefer the one shown in Fig. 2, if a large number of nodes are to be extirpated. I have never found that the transverse incision, as recommended by Dowd, gave the exposure of the deeper structures which a longitudinal one does. The latter is made over the middle of the sternoclidomastoid, and can be extended at its upper and lower ends in an anterior and posterior direction to remove nodes in the submaxillary and supraclavicular regions respectively.

If sinuses exist (Fig. 4), their walls are curetted and the skin edges extirpated. If a large abscess is present, I prefer to open it under Schleich anæsthesia a few days to a week before the radical extirpation, in order to avoid an infection of the entire operative field with tubercle bacilli. The radical operation begins with the above longitudinal incision carried through the skin and deep fascia until the anterior border of the sternomastoid muscle is exposed. This is always the first landmark, and by adhering to the routine of following the anterior and posterior borders of this muscle much time will be gained in getting one's bearings, so to speak, as to the relation of the enlarged nodes to the principal vessels and nerves.

The deep cervical fascia is thoroughly divided with a scalpel and the sternomastoid muscle freed along both of its borders. Great care is taken to catch every bleeding-point at once. The majority of the superficial and many of the deeper vessels require no ligature, the exception being the external jugular vein, which it is impossible to avoid severing. When the edges of the wound are well retracted, the extirpation proper is begun by either catching the node with an artery-forceps, or, better still, with a sharp-pointed, short-tined retractor, and the node drawn toward the surface. I have found a blunt-pointed, short-bladed curved scissors far better than a Kocher dissector. One can work the node loose from its adherent surrounding tissue, and at the same time cut toward the capsule in separating these adhesions, without constantly changing instruments. I never employ a scalpel after the sternomastoid borders have been exposed. If the nodes are adherent to the internal or anterior jugular or to the carotid, no accident ought ever to happen if the above-described combined traction, blunt dissection, and an occasional cut of the capsule are employed. I have repeatedly exposed the internal jugular from chin to clavicle without ever having injured it. It is of great importance not to pull a node away from the jugular and then to cut between. If one does, the jugular, being very elastic, is pulled out, and easily.(?) By inserting the blunt scissors between the vein and the node, the latter can be easily stripped from the vein wall.

One will encounter some obstinate bleeding from arteries and veins which supply the nodes themselves. Leaf has called attention to a condition I have myself occasionally encountered. A node which is adherent to the internal jugular will have a short, wide vein emptying directly into the jugular. It is impossible to avoid cutting this communication, and the hemorrhage may be so severe as to cause one to think that the main vessel has been cut. If this branch is too short to be ligated, it is best to transfix the wall of the jugular with a non-cutting needle armed with catgut, and thus by applying a parietal ligature check the hemorrhage.

The upper set of deep cervical nodes are best extirpated by pulling the muscle backwards (Fig. 6), and the lower, including those lying in the posterior triangle of the neck, by pulling the muscle forwards. (Fig. 6.)

The position of the spinal accessory nerve must always be borne in mind. It emerges from the sternomastoid at its middle, and passes almost transversely across the posterior

triangle to enter the trapezius. It is often imbedded in the midst of enlarged nodes, and easily severed in enucleating them at this point.

I have often identified it by pinching it lightly with an artery-forceps, and then watched the trapezius muscle contract. When severed, the patient is unable to raise the injured shoulder (Fig. 5) as high as the normal, but this can be compensated for in course of time.

On the left side one must bear in mind the position of the thoracic duct. I cut this recently in one case, which had been previously operated upon by another surgeon so that extensive cicatricial tissue existed. At the first dressing a considerable amount of thin, milky fluid escaped, but by packing the wound firmly this ceased within a week. This treatment is usually effective, suture being seldom required.

In the majority of cases of injury of the thoracic duct so far reported, only one of the main branches has been wounded, so that packing the wound tightly usually suffices. A thorough removal of all fat will be of great aid in preventing recurrence.

NORTHWESTERN UNIVERSITY MEDICAL SCHOOL

Department of Gynecology

CALCIFICATION IN GYNECOLOGY[1]

By FRANK T. ANDREWS, M.D., CHICAGO

I DO not come before you to-night to defend a thesis, for I have no new facts to present or theories to advance. The intent, rather, is to make a review of the known facts concerning mineral deposits in the tissue, as a preface to the narration of a few clinical observations.

If we understand calcification to be the deposition of lime salts within the tissues of the body, then by the terms of our definition we exclude from the discussion all deposits but the calcium salts and all deposits that occur, not within the tissues, but in the cavities of hollow viscera or glands. On these two counts, then, we must exclude from our subject the calculi, the gouty deposits, and cholesteatomata. Yet one may hardly discuss calcification without making brief mention of these allied subjects, if only to emphasize the likeness and difference.

A calculus is, usually, a concentrically laminated concretion formed about a nucleus. The nucleus may be a foreign body, or a group of crystals, a mass of urates, or any object, as a mass of epithelial cells. The composition of a calculus is determined by the nature of the secretion in which it is formed, changes in the secretion being recorded in the stone by variations in the appearance and composition of the laminæ. Vesical calculi afford the best illustrations of this. If the urine is alkaline, the resulting stone will be ammoniomagnesium phosphate, with perhaps some phosphate of lime, or if nearly neutral, carbonate of lime; but if acid, some other ingredient will be deposited. Since urine is acid when secreted, renal stones are composed of uric acid and the urates, and of oxalate of lime, the oxalic acid being a derivative of the uric acid. The harder vesical stones, also, are composed of these elements. The softer or more friable ones are of phosphate, cystine, xanthine, or carbonate of lime. Usually, the nuclei of even the phosphatic stones are uric acid or oxalate, the remainder of the stone being phosphatic or in alternate layers, corresponding to periods of alkalinity or acidity of the urine. Foreign bodies in the urine acquire a coating of phosphates.

With the exception of some of the vesical

[1] Read before the Chicago Gynecological Society November 1905

calculi, the renal calculi, gall-stones, and enteroliths, all calculi are deposited from alkaline media, and are therefore chiefly composed of phosphates. Well-known examples of phosphatic stones are prostatic, salivary, lacrimal, and mammary calculi. The incrustation upon a pessary, too long worn, is of a similar nature.

In the production of a calculus, one of the steps is analogous to true calcification. There is a nucleus surrounded by a film of mucus mixed with *débris* of blood, pus, or epithelial cells. From the fluid the granules are deposited in this film, just as they are deposited in a caseous focus within the tissues. Additional layers of mucus and more granules account for the continued and concentric growth. Prostatic and salivary calculi are of phosphate of lime, with a trace of carbonate and about 15 per cent of animal matter.

Gall-stones are composed of cholesterine, and sometimes a small amount of carbonate of calcium, with bile pigment.

Pancreatic stones may be of calcium oxalate, but more frequently they are of calcium phosphate or carbonate.

Calcified sebum in sebaceous glands has a concentric arrangement, due entirely to the fact that the epithelial elements in the secretion were so arranged before the lime salts were deposited in the mass.

I remember a case in which many of the pearl-like degenerative epithelial masses within occluded sebaceous glands of the forehead, nose, and cheeks were calcified in various degrees. Some were easily broken down by pressure of the thumb-nail after removal; others were quite hard and shot-like. The largest was, perhaps, the size of a small pin-head. Billroth (1) recognized a similar condition.

Forster (2) reported a case in which the tumor on the temple was oval, about .16 centimeter in diameter, and of stony hardness. The tumor was excised, and found to be of calcium phosphate, with a small proportion of calcium carbonate, epithelial *débris*, and fatty matter.

When phosphates are laid down in sebum or other detritus in gland acini, as in this case, the *process* is really one of calcification, although the result is a calculus.

Sometimes the process is not complete, and only enough salts are deposited to give the sebum a gritty feeling. I have noticed this in the sebaceous contents of a dermoid. A similar condition has been observed in the retained secretion within the prepuce, and even faceted calculi have been removed from that place.

Any concretion in the alimentary canal is an enterolith. It may be a gall-stone, a pancreatic stone, a fecal concretion impregnated with phosphates, a hairball or a bezoar.

The Oriental bezoar is a dark, highly polished concretion of ellagic acid found in the stomach of an Eastern species of antelope, and one of the goats. It is derived from a plant upon which these animals feed. It has a peculiar interest, because for centuries it was used medicinally as an antidote for poison of any kind. Even the possession of the stone was supposed to ward off danger of being poisoned. Bezoars were very highly prized, fine specimens selling for thousands of dollars.

Occidental bezoars are inferior; they are composed of resin or bezoardic acid. Bezoars were referred to in England by Frampton as early as 1580, and were in the London Pharmacopœia as late as 1746.

Masses of ambergris are formed in the intestine of the spermaceti-whale, and are often found floating upon the ocean or cast upon beaches. Masses weighing two hundred pounds have been found. Ambergris is a waxy concretion, valuable for mak ng perfumes. It is probably derived from the squids upon which the whale feeds.

Enteroliths may be classified thus:

1. Gall-stones and pancreatic stones.
2. Balls of animal hair or vegetable fiber.
3. Concretions of ammonio-magnesium phosphates.
4. Oriental bezoars (ellagic acid).
5. Occidental bezoars (resin or bezoardic acid).
6. Ambergris.

In gouty subjects the chalkstones, or tophi, are composed of sodium and other urates. Lewandowsky (3) describes tophi of calcium carbonate about joints.

Cholesterin crystals and stearin are found in the body, in the meningeal tumor called cholesteatoma, which glistens and shines with

a metallic luster. They also occur occasionally as glittering, sparkling flakes in the fluid of ovarian cysts, and of cystic goiter, and in sebum.

The depositon of lime salts occurs normally in the intercellular substance of cartilage and fibrous tissue as a preliminary step in the process of bone formation; and, later, the process goes on in the newly formed bone lamellæ during the entire period of bone formation and growth. A similar calcification occurs in the costal and other cartilages in age, usually without any effort at bone formation. It occurs, also, through the agency of epiblastic epithelial cells of the enamel organ, in the formation of the enamel of teeth while the odontoblasts are forming the dentine and the dental sac is producing the cement.

Normally, also, the amylaceous or colloid concentric corpuscles found in the pineal gland, as well as sometimes in the Pacchionian bodies and in the arachnoid, are calcified.

Among lower forms of life the process may be observed in both epithelial and connective tissues, in tissues derived from the epiblast and those from the mesoblast. In mollusks and shell-fish generally the shell is produced by the shell-gland, a fold of columnar epiblast. Pearls are calculi formed in follicles of the shell membrane or between that membrane and the shell. In the cuttlefish the cuttlebone is also formed from such an epiblastic membrane. In echinoderms the calcareous spicules, plates, and spines are derived from the dermal mesoblast.

The shell of crustaceans is produced by the epidermis, the degree of calcification varying in different genera. Many forms, as the lobster, cast off and renew the entire covering annually.

Coral is produced by polyps; the carbonate of lime being laid down within their bodies like a skeleton, the young polyps budding out from the older and building upon their remains.

In sharks the small scales are calcified dermal papillæ.

In sturgeons and gars there are plates of calcified dermal mesoblast, and also horny scales with enamel surfaces.

On the beak of the chick is a calcareous nodule, which soon falls off. It is supposed to be used in breaking the shell of the egg.

The spicules of sponges are each produced by a mesoblastic cell, and sometimes groups of spicules from one cell.

Egg-shells are of maternal origin, being formed by the epithelial cells of the oviduct during the passage of the ovum.

Pathologically, calcification takes place in tissues having a deficient blood-supply or that have undergone some form of degeneration, usually hyaline or fatty, and in dead tissue, pus, blood-clot, or caseous material.

It is important to note that whereas in vesical calculus the phosphate is the ammoniomagnesium salt, here we almost constantly find it as the tribasic calcium phosphate.

Sometimes calcium carbonate occurs, and, very rarely, calcium sulphate.

The most common example is the calcification of atheromatous vessels and cartilages in old people. Such calcifications may even be followed by the production of true bone in the form of plates or scales in parts of the calcified area. So, calcified areas in the lung may be transformed into bone.

Caseous foci either soften and liquefy and are absorbed, or they become calcified. Purulent and fibrinous effusions may be transformed into cheesy detritus and become calcified.

Calcification may affect the cells themselves, or, as is more usual, the lime salts may be laid down in the intercellular substance by the cells.

The deposit occurs in the following forms:

1. As free granules among the fibers of a tissue

2. The tissue may be so thoroughly impregnated with lime salts as to present almost a bony appearance, and parts of the area may be converted into bone.

3. As calcareous granules within cells.

4. Spines, spicules, or needle-shaped crystals.

5. Concretions or concentrically laminated bodies may be scattered through the tissue.

The latter form results from the calcification of concentric colloid masses. (Virchow called them amylaceous corpuscles.) Such bodies are found in the arenoid tumors of the brain and meninges.

A tumor containing *brain-sand*, whether myxoma, angioma, fibroma, or sarcoma, was called by Virchow a *psammoma*. Similar bodies were first described by Kolisko (4) in certain carcinomata of the ovary, and their metastases — *psammous carcinomata*.

In the majority of cases the deposit occurs among the fibers of fibrous tissue, although it has been observed in lipomata, and in uterine myomata it is not uncommon.

Among interesting examples may be mentioned the calcification of the fibrous capsules of trichinæ, as observed by Virchow (5), Lueckart (6), and Ehrhardt (7). In some cases the trichinæ themselves were calcified in uncalcified capsules.

Metchnikoff (8) mentions calcareous bodies formed around tubercle bacilli in giant cells.

Sometimes calcification has the appearance of being a conservative process, an effort on the part of nature to convert a degenerated mass into an innocuous body,—that is, to embalm it,—but we have no knowledge that the calcified mass is less harmful than the original degenerated area. Thus phleboliths are thrombi impregnated with phosphate of calcium and the sulphate of calcium and potassium.

The most striking example of this apparently conservative effort is found in the *lithopedion*.

Of greatest interest to us, as gynecologists, are these cretefactions within and near the genitalia in women. Here, as elsewhere, we find lime deposited in atheromatous vessel-walls and in caseous lymph-nodes. Phleboliths, also, are occasionally found, especially in the veins of the broad ligament.

It is very common to find lime nodules upon the peritoneum, especially near or upon the Fallopian tube. Such a nodule, of course, represents the final stage in some degenerative process. Originally, the nodule may have been a product of inflammation, of tuberculosis, or of syphilis. It may have been a blood-clot in the tissue, or a mass of fibrine adhering to the peritoneal surface. These peritoneal nodules are usually small. If scattered generally throughout the cavity, they are probably calcified tubercles. If clustered about the fimbriated extremity of the tube, with no evidences of tuberculosis, they are probably inflammatory products that have escaped from the tube and have become calcified. I have seen the fimbriæ gritty with such incrustation.

Calculi in the tube are rare. In fact, I think that true calculus formation never occurs there.

In the following case I believe that the stone was a calcified corpus luteum from a disorganized ovary.

Polaillon (9) describes the stone as a concretion found in the pavilion of the oviduct, weighing about five grams. It was regular and nodulated, and in places showed convolutions resembling those on the cerebrum. As no ovary was found, he was convinced that the calculus was the calcified atrophied ovary.

Four other cases are recorded, all of them evidently calcified, inspissated, inflammatory products.

Mantegazza's (10) case and Scarenzio's (11) were evidently of this nature, the latter showing calcification in the round ligament as well.

Cullen (12) reported a calculus having the shape of the letter S.

Lincoln (13) cites a case of a patient, only 29 years old, who was married twelve years, but never pregnant. The right tube contained concretions at various points. In the left tube, near the uterine end, a part of the lumen was filled with a pencil-like body of stony hardness.

Of all the calcified bodies, the lithopedion is probably the most interesting and the most written about. This condition is very rare; the calcification is in the form of an incrustation on the surface of the sac containing the fœtus. Sometimes the fœtus is converted into adipocere, a waxy substance, which is chiefly ammonium margarate with some calcium and potassium margarate. The mass lies within the calcified sac. The shortest time between the escape of the fœtus into the abdominal cavity and the discovery of the lithopedion that I have found record of is one and a quarter years, in a case reported by Dr. Plexa. In this case the report of the autopsy mentions calcification as "*having commenced*." In the other cases mentioned the length of the time between the pregnancy and the autopsy varies from twelve to fifty-five years.

In the ovary and the various ovarian tumors

the structure and arrangement of tissues is such as to give peculiar interest to these deposits. Nodules and plates in the walls of ovarian cysts are common, as one would expect from the great frequency of degenerated areas.

I removed per vaginam, from a woman thirty-eight years old, a small dermoid of the size of a golf-ball. The wall of this dermoid was calcified in a thin, easily broken layer. During the removal the film of lime-broke, imparting a crackling sensation to the finger, but the fibrous wall remained intact.

During January of this year I observed in a specimen from my clinic a calcification of the theca surrounding a Graafian follicle, and in September last I removed a cystic ovary associated with pyosalpinx from a woman of thirty-four. Imbedded in the surface of this ovary was a spherical concretion five eighths of an inch in diameter. Its surface was covered with miniature convolutions, in form like those on the cortex of the brain. The resemblance of this object to that described by Polaillon is marked. I believe it to be a calcified corpus luteum.

Several years ago I exhibited before this society an ovoid, fibrous tumor of the ovary, three and a half inches long, completely calcified. This tumor, when laid open with a saw, showed a uniform density throughout. Microscopic sections of a decalcified specimen showed only fibrous tissue. Kolisko has described a carcinoma of the ovary containing concretions. This tumor is of especial interest from the fact that even the metastases from it contain similar concretions, showing an inherent tendency in the growth to produce bodies (perhaps amylaceous corpuscles) that afterwards calcify in concentric layers.

In the uterus we may find calcified atheromatous vessels, phleboliths, and calcified tubercular deposits, as in other organs.

Syphilis leaves its record in the calcified degenerated areas in fœtal membranes, placenta, and cord.

Womb-stones are usually the product of degenerative areas in myomata. They are found in subperitoneal, interstitial, and submucous fibroids. Stones in submucous and interstitial tumors may be discharged, via the uterine canal, per vaginam.

The concretions may be single or multiple. They may be very minute or may reach the size of a fœtal head.

Many cases of the discharge of these stones have been reported, but I have never had the opportunity to observe one.

From these reports it is evident that the signs and symptoms markedly resemble those of carcinoma uteri. The patients are usually old. As the passing into the uterine canal is by a process of ulceration, there is a bloody, offensive discharge, and much pain. The vast majority of these masses are of no moment to the patient. They lie quietly within the tumor, producing no symptoms, and giving no sign of their presence.

In the vagina, lime deposits on pessaries are common enough. Dr. Getchell (14) reports a specimen of calculus, three inches long, one and a quarter inches wide, and three eighths of an inch in thickness, formed about a hairpin as a nucleus, which he removed from the vagina of a girl of nineteen. Toward one end of the calculus was a concavity into which was adapted the neck of the uterus.

Dr. Harlow (15) reports a lady of 76 years who ceased menstruating at 46. For the last five years she has had some hemorrhages. The examination showed a calculus concretion over the os uteri shaped like an egg-shell. It was broken up and removed in fragments. It contained no bony tissue. It was composed of carbonate of lime.

Calcification in the walls of the vagina is not of frequent occurrence. Layton (16) describes the case of a patient, aged 49, with a phosphate of lime calculus in a cyst in the anterior wall of the vagina. The stone, as large as an olive, passed into the vagina through an opening caused by ulceration. It seems impossible to trace the history of this stone. The author very carefully proved the non-existence of any communication with the bladder, and finally concluded that it was formed in a cyst in the vaginal wall. I am of the opinion that, in spite of its large size, it was a phlebolith.

Gibbs (17) reports a case of a colored woman, aged 45, who died of tubercular peritonitis. At the post-mortem, thirty-one small white calculi, in size from a pin's head to a small

pea, were removed from between the external and middle coats of the vagina. These specimens were analyzed and microscopically examined by Dr. Lionel Beale. His conclusion was that they were probably phleboliths.

I have a very similar specimen to exhibit. The patient, aged 30, was referred to me by Dr. Shaw, of Joliet. She did not consider herself sick, but was annoyed by a slight leucorrhœa, resulting from a chronic endometritis. Upon examination, I found the vaginal walls studded with countless shot-like nodules, several hundred at least. As these bodies were in no way responsible for the condition under treatment, and as I considered them harmless, I removed but a few for further examination. As you see, they range from the size of a hempseed down. Without doubt, these also are phleboliths.

BIBLIOGRAPHY

1. Billroth's Surg. Path., Hackley, 1870, p. 620.
2. Boston Med. and Surg. Jour., Jan. 30, 1879.
3. Virchow's Archiv., bd. clxxxi, heft i, 1905, p. 179.
4. Wiener Mediz. Jahrbucher, Jahrg. 1844.
5. Die Lehre von den Trichinen. Berlin, 1866.
6. Die Parasiten des Menschen.
7. Ziegler's Beitrage, u. s. w., p. 41.
8. Comparative Path. of Inflammation. Trans. by Starling, 1893, p. 162.
9. Sajou's Annual, 1895, vol. ii, g. 69.
10. Gazz. med. ital. lomb. Milano, 1852, 3 S., iii, 215.
11. Ibid., 1853, 3 S., iv, 246.
12. Johns Hopkins' Report, vol. iv.
13. Cleveland Med. Gaz., March, 1897, p. 268.
14. Philadelphia Med. Times, July 5, 1873, p. 634.
15. Boston Med. and Surg. Jour., Sept., 1870, p. 70.
16. New Orleans Med. and Surg. Jour., Aug., 1878, p. 101.
17. Trans. Path. Soc. of London, vol. v., 1854, p. 235.

SIMPLIFYING MODIFICATION OF KRONLEIN'S TRIGEMINOUS OPERATION

Written for Surgery, Gynecology and Obstetrics

By PROFESSOR DR. ERICH LEXER

Director of the Royal University Clinic and Policlinic at Königsberg, Prussia

Translated by E. C. RIEBEL, M. D.

WITH report of two cases and demonstration of anatomical specimens, I described before the last congress of the Deutsche Gesellschaft für Chirurgie an operative procedure modifying Krönlein's method to expose the second and third branch of the trigeminous at the base of the skull. This modification renders Krönlein's operation still simpler than those given by Kocher and Hildebrand. A recent experience with two additional cases justifies the desire to apprise surgeons at large of this simple operation.

The operation consists of the following steps (see drawings): The cutaneous incision passes along the upper margin of the zygoma, through skin and temporal fascia. It begins anteriorly at the upper anterior zygomatic angle, close to the posterior margin of the fronto-sphenoidal process, ending posteriorly immediately in front of the temporal artery. It is necessary to cut this. In order to cut the zygoma, pull the posterior angle of the wound downward and pass a needle armed with a chain-saw around the zygomatic process of the temporal bone. Saw the bone obliquely in a posterior and outward direction. Next a chisel — not too wide (about the same as I use in my Gasserian ganglion operation) — is applied to the upper margin of the zygoma, close to the base of the frontosphenoidal process, and the zygoma severed, with preservation of all soft parts—entirely subcutaneous—in a forward and downward direction.

Upon retracting the mobilized zygoma, inclusive of the margin of the wound downward, the *temporal muscle* is brought into view. The posterior margin of the muscle is detached bluntly from the bone and forcibly pulled forward by a blunt hook. In case of small

Fig. 1. Incision. Bone detachment.

facial bones or strongly developed muscle, nicking of the margin of the muscle is advisable. The retraction of the muscle renders the *infra-temporal crest* accessible. This is located with a blunt instrument (to avoid contact with the finger), and the periosteum cut exactly on top of the crest. If, by mistake, the insertions of the pterygoid muscles are attacked, the further course of the operation becomes a bloody and difficult one. A blunt hook about two centimeters in width is applied to the periosteal wound, running at right angles to the infratemporal crest. Employing the hook as periosteal elevator, periosteum and pterygoid muscles are detached from the bone. This accomplished, the detached muscles with the zygoma are retracted downward and somewhat forward by the hook previously attached to the wound. This exposes at once the *infratemporal fossa* (zygomatic fossa), and in its posterior portion the foramen ovale with the third branch. It is now not difficult to pull this forward with a small curved hook in order to grasp it by forceps for the purpose of evulsion.

This accomplished, the foramen and the vicinity is to be closely scrutinized for any remaining branches. If the nerve is grasped close to the foramen ovale, injury of the middle meningeal artery may be avoided. The artery is covered by the condyloid process of the inferior maxilla, and is seen in anatomical specimens in looking downward and backward from the anterior portion of the wound. The incision serves likewise for removal of the second branch, if this becomes necessary.

All that is necessary is to place the head in such a position that one can view the field from the posterior margin of the wound in a downward and forward direction. The nerve is located at the entrance of the *fissura orbitalis inferior* (*spheno-maxillary fissure*), surrounded by loose adipose tissue. From this the nerve is picked up by a hook, separated from the fatty tissue by smallest sponges and tissue-forceps. When absolutely certain that the entire nerve is separated, it is grasped and evulsed.

Removal of the second branch has been performed by me, in conjunction with that of the third branch, in the above manner, in

Fig. 2. The second branch is pulled forward by a thread, the third branch lies upon a small hook. Above the third branch the foramen ovale is plainly visible at the cristal infratemporalis. The broad retractor, serving for detachment of periosteum, pulls the lower margin of the wound, as well as the zygoma, downward.

one case, without difficulty and quite successfully. At the close of the operation, the displaced zygoma is pushed upward. Bone or periosteal suture is superfluous, the cutaneous suture furnishing a sufficient support. It goes without saying that an electric headlight is a valuable aid in an operation at such a depth upon such fine strucutres. However, this is not absolutely indispensable.

In my second case, the inefficiency of the lamp compelled me to finish the operation without it. In this I well succeeded, placing the head in a position to receive the full benefit of the daylight upon the wound.

Difficulties are excluded if the operation is performed with full confidence and after sufficient practice upon the cadaver. It is essential, however, to bear in mind that the smallest deviation from the rules laid down may be followed by failure. One not thoroughly versed in the exact anatomical details cannot perform this operation any more than they can resection of the Gasserian ganglion.

There is one obstacle which, at times, may render the success of the operation doubtful—this is *hemorrhage*. This varies, as in ganglion operation, with different individuals. It is now slight, again copious, and at times very severe. Commonly, one vein only is the source of hemorrhage. This emerges from the foramen ovale, joining the pterygoid plexus. Hemorrhage from this is not severe, and is easily controlled by tamponing for a few minutes.

Omitting to incise the periosteum of the infratemporal crest (pterygoid ridge) and to detach the same, getting into the pterygoid muscles instead, is an error invariably followed by injury of the pterygoid plexus and violent hemorrhage. Correct and strict observances of all the rules may occasionally be followed by violent hemorrhage. I experienced this in my last case, that of a physician sixty years of age, with a marked arteriosclerosis. I consider it particularly noteworthy that, despite this, I was able to finish the operation in two sittings.

For the possibility of hemorrhage at the bottom of the wound, Krönlein was prompted to recommend extensive exposure of the infratemporal fossa, and this possibility may likewise furnish the one objection against my method. In the aforementioned patient, the cutaneous vessels bled to a degree observed only in hæmophilics. The small muscular and periosteal vessels behaved in a like manner. Above all, however, was the hemorrhage caused by the companion vein of the nerve after detachment of the periosteum. The hemorrhage was so violent that a firm tampon applied for a half-hour did not produce a moment's cessation, sufficient to see foramen and nerve. In consequence, I tamponed the wound firmly with iodoform gauze, after the patient had been under the anæsthetic for forty-five minutes, and discontinued the operation. Three days later, the patient had recovered sufficiently to risk another short anæsthesia. With constant hydrogen peroxide irrigation (3 per cent) I slowly and carefully loosened the tampon, applied the retractors to pull the temporal muscle forward and the zygoma downward, perceiving at once the nerve at its exit from the foramen.

Grasping and evulsion were accomplished without difficulty. The patient left his bed a week later, and went home twelve days after the first operation.

Even the possibility of violent hemorrhage at the bottom of the wound, then, does not compel one to perform an extensive preliminary operation; taking recourse in these certainly exceptional cases of violent hemorrhage to the two-step operation. In this manner the procedure described proves successful, even with very pronounced hemorrhage.

At the close, I should like to emphasize the advantages of the procedure, namely:

Simple incision and subcutaneous detachment of the zygoma.

The operation may be done in a short time, excepting in cases with severe hemorrhage, where the two-step operation should be practised.

Injury of the facial nerve, with exception of unimportant frontal branches, can be avoided with certainty.

Hemorrhage, as a rule, is slight, and easily controlled, by evasion of the pterygoid plexus (due to detachment of periosteum in fossa infratemporalis).

Ligation of arteries (temporal and middle meningeal arteries) is omitted.

Inferior maxilla is not injured,

Bone suture is not required; the zygoma subcutaneously severed retains sufficient communication with the soft parts.

Finally, the possibility to obtain more extensive access to the structures at the bottom by another method is not precluded should the necessity arise.

JOSEPH BACON'S DUMB-BELL INTESTINAL ANASTOMOSIS

By BYRON ROBINSON, M. D., CHICAGO

DR. JOSEPH BACON of Macomb, Illinois (formerly of Chicago), has invented a simple, convenient, and reliable mechanical device for intestinal approximation, or anastomosis. Dr. Joseph Bacon is well known to the medical profession as a proctologist and deviser of new methods of operation. Some years ago he presented to the medical profession the new operation for anastomosis of the sigmoid to the rectum for rectal strictures. This operation was extensively employed and lauded, especially by the German surgeons. At present Dr. Joseph Bacon presents a valuable simple device which is employed in a simple method. The merit of the invention is its simplicity, its convenience, and its safety. No supporting sutures are required for Dr. Bacon's new mechanical aid in intestinal surgery. *The device is a hollow dumb-bell.* Hence it is named accordingly. It is composed of metal (it can have other composition). The dumb-bell is placed in the concentric lumina of two intestines, which are drawn through an intestinal incision located proximal or distal to the position of the approximation, and an elastic ligature is applied. The elastic ligature necroses through the intestinal walls in a few days, resulting in a perfect cicatricial union of the approximated intestinal circumference. For circular enterorrhaphy or end-to-end intestinal approximation it is absolutely ideal. Dr. Joseph Bacon not only presents a new device for intestinal anastomosis or approximation, but a most valuable new method for operation in the use of the elastic ligature. A meritorious feature of Dr. Bacon's method of operation is, that the elastic ligature includes not

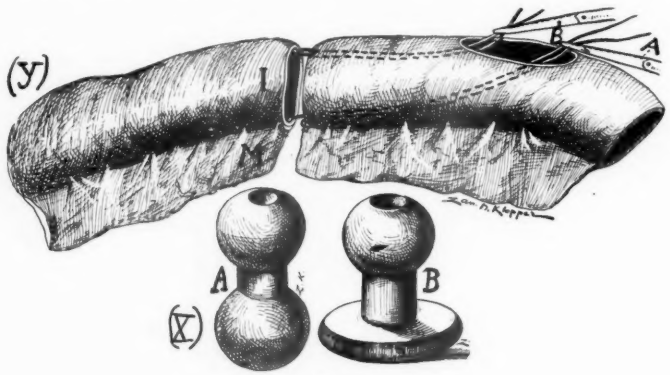


Fig. 1

Fig. 1. X presents two dumb-bells, A and B. One, B, is larger at one end than the other. Y presents the severed intestine with two ligatures properly placed and being drawn through an intestinal incision at a distance from the approximation.

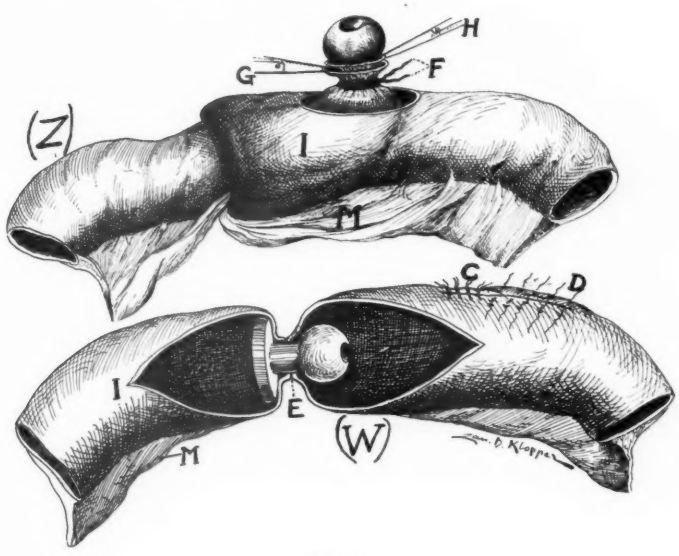


Fig. 2

Fig. 2. Z presents the dumb-bell in the concentric intestinal lumina with the elastic ligature; F, tied. W presents a final intestinal view of the dumb-bell in position with line healed approximation, E.

only the three distinct layers of the intestine, colon, or stomach,—mucosa muscularis or serosa,—but also ample mesentery (neurovascular visceral pedicle), to insure against necrosis or gangrene and consequent perforation. Every abdominal surgeon knows full well that the most important factor in intestinal approximation or anastomosis is to preserve ample blood-supply for definitive, perfect healing. Bacon's dumb-bell method accomplishes this most excellently. In the specimens resulting from dumb-bell intestinal approximation from Dr. Bacon's experimentation, ideal union may observed without a decrease in the size of the lumen. The medical profession is delighted to inscribe his name on the roll of honor, with a vote of thanks for his contribution to the science of medicine. The illustrations will explain Dr. Bacon's new invention and new method of operating a thousand-fold better than words.

COOK COUNTY HOSPITAL

Department of Surgery

THE PROGRESS OF LIVER HEMOSTASIS—REPORTS OF CASES (RESECTION, SUTURES, ETC.)

By WILLIAM E. SCHROEDER, M. D., CHICAGO, ILLINOIS

Surgeon to Cook County, Wesley, People's, and Provident Hospitals; Professor of Surgery and Clinical Surgery, Northwestern University Medical School

IN presenting a paper on the subject of liver hemostasis, it is my desire to give a brief review of the history of its progress and to show the evolution of the various methods employed; furthermore, to relate my experience, gathered from a number of stab and gunshot wounds and from a resection of a large portion of the liver for primary tumor.

From the earliest times, opportunity for advancing the technique of liver surgery was never lacking, because there were diseases and injuries to deal with, as at present; still, from the time of Hippocrates to Pirogoff (Anschütz, 1) we find that liver wounds were considered fatal, and although the indications for interference were plain, because of the severe hemorrhage, no attempts were made to control it. Isolated cases of recovery from serious liver injuries were recorded from time to time. An interesting example of this was reported by Fabricius Hildanus (2) in the early part of the seventeenth century. A young man was stabbed during a quarrel, and suffered from a severe hemorrhage. A large piece of liver appeared in the wound and was removed by forceps. In spite of this fact, the patient recovered. Three years later he died of an intercurrent disease, and the post-mortem showed a distinct scar and an absence of a portion of the liver, while the remainder was normal.

L. Mayer (3), in his invaluable monograph of 1872, on "Wounds of the Liver and Gall-bladder," found a mortality of only 59 per cent, showing that a great many such cases did recover. Notwithstanding this, the progress, from a surgical standpoint, was extremely slow. However, this can be attributed to the fact that, first, there was little or nothing known as to how much liver tissue the organism could lose without fatal consequences; secondly, infection was, of course, a dreaded complication; and lastly, the hemorrhage was uncontrollable.

Holm (4) of St. Petersburg, in 1867, produced wounds of the liver in animals for the purpose of studying inflammation of the liver-cells. His experiments were followed by others. L. Mayer not only collected the statistics of injured livers, but made further experiments by attacking the liver of rabbits directly, making wounds, driving in wooden pegs, pressing in bullets, and also removing portions of the tissue. He remarked that the hemorrhage was comparatively slight. Terillon (5), in 1875, did experimental work on ruptures of the liver. Tillmanns (6), in 1879, removed wedge-shaped pieces from twelve animals under a constant antiseptic spray. He closed the abdominal wound without suturing the liver, and all recovered. He also expressed surprise at the small amount of hemorrhage. He concluded that liver wounds are dangerous only when large vessels are involved, and that the low blood-pressure and slow current in the liver-vessels favor a more rapid hemostasis than in other organs.

Escher (7), in 1886, removed an adenoma of the liver, but the patient died from hemorrhage. Langenbuch (8) resected a constricted lobe weighing 370 grams, in 1888. The patient had a severe secondary hemorrhage, necessitating immediate interference. The abdomen was found full of blood, caused by the bleeding of a vessel of the stump. This was ligated and the patient recovered. These two cases alarmed the surgeons, and proved to the profession the seriousness of hemorrhage in liver surgery, and prevented much progress being made for several years.

However, in 1887, Burkhardt (9) suggested that the only rational treatment of hemorrhage

of the liver was immediate laparotomy, finding the source of the hemorrhage, and stopping the same.

Glück (10), in 1890, in experimental work on animals, found that one third of the organ could be removed with safety. He found the elastic ligature of great value.

Ponfick (11), in 1889, 1890, and 1895, carried similar experiments still further, in order to determine how much of the liver could be removed without fatal results. He found that about forty per cent could live after seven eighths of the organ had been removed. He also deserves the credit of having attached the proper importance to the regenerative power of the organ. He removed three fourths of the liver, and observed that it regenerated to four fifths of its normal weight, and in some cases to its full weight. The secretion of bile did not suffer to any visible extent.

From these experiments it becomes evident that we need not fear any marked effect upon the system from the loss of liver substance, and with the control of asepsis there remains only one danger—that of hemorrhage.

VARIOUS METHODS OF HEMOSTASIS

As before stated, in 1886 Escher removed an adenoma about the size of a man's head. This tumor had a broad base, which he divided with a thermocautery, resulting in a severe hemorrhage. He then tried to suture the stump to the abdominal walls, but all the sutures cut out. Patient died six hours later.

This, then, is the first time that the cautery and sutures were used in an attempt to allay hemorrhage after resection. Although it failed this time, both methods have been repeatedly used since successfully.

Langenbuch (8), in 1887, removed a constricted left lobe. In this operation he used mass ligatures, and then divided, ligating the large vessels again after division.

In the same year, Loreta (12) resected a left lobe for echinococcus cyst, and used a large silk ligature as a constrictor. After removing a piece 15½ by 14 cm., he circumstitched the bleeding points with catgut and ligated. He then sutured the capsule above with the capsule below, covering the raw surface. This is the first attempt to establish the continuity of the liver.

Pozzi (13), in 1888, enucleated an echinococcus cyst of the left lobe. He ligated the larger vessels, sutured to diminish the size of the wound, and then sutured the liver to the abdominal wall, giving us a combination of methods.

Tillmanns (14), in 1889, encountered a tumor the size of a goose-egg, from which he excised a portion for microscopical examination, and then sutured the liver to the abdominal wall. After the diagnosis of gumma had been made, he destroyed the same with the thermocautery. This procedure represents the first two-stage operation for the removal of liver tumors.

Terillon (15), in 1890, attempted to remove a large, pedicled echinococcus cyst by using the cautery. A severe hemorrhage followed, whereupon he applied the elastic ligature and sutured the pedicle to the abdominal wall, allowing the cyst to become gangrenous, and removing it after seven days. This procedure represents the first application of an elastic

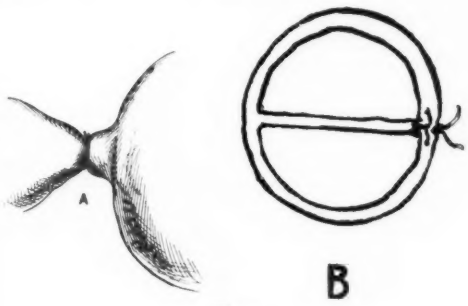


Fig. 1

ligature as a permanent constrictor. Fortunately, there are not many such cases on record.

Clementi (16), in 1891, in the case of fibrosarcoma of the mesocolon, which was adherent to the liver, found it necessary to resect a portion of the latter, during which he used compression clamps. He cut out a piece, 9 by 5 cm., by Paquelin cautery, thus giving us the first application of provisional compression clamps.

Ullmann (17), in 1892, resected a portion of liver for a carcinoma, which had extended from the gall-bladder, with a thermocautery. He then folded in the edges of the liver and

used the tampon, thus combining tampon, suture, and thermocautery.

E. Doyen (18), in 1892, in a case of pedunculated echinococcus cyst, transfixed the pedicle and used a ligature similar to the Staffordshire knot (see Fig. 1, *a*, *b*), and placed a circular ligature around the stump.

Israel (19), in 1894, used the elastic ligature as a temporary constrictor, while he was removing an angiosarcoma weighing 1225 grams.

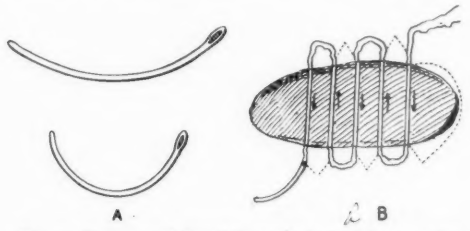


Fig. 2. Kousnetzoff Penski's method; (a) blunt needles; (b) mattress sutures.

He treated the stump intraperitoneally. At this time it was common to use the elastic ligature as a permanent constrictor, and to treat the stump extraperitoneally. One can see that this latter method can be employed in cases only where the stump can be readily brought into the abdominal wound.

Kousnetzoff and Penski (20), in 1894, introduced a method of suturing which was a decided improvement upon all former methods. First of all, they laid great stress upon the importance of using blunt needles, so as to prevent injury to the vessels. (Fig. 2, *a*.) This needle, armed with a double thread, is passed back and forth through the liver some distance above the line of resection, leaving slack thread between the points of insertion. These threads are cut and the ends tied, producing gentle pressure, thus controlling the hemorrhage. (Fig. 2, *b*.) This is really a modified mattress suture. Then they circumstitched the larger vessels in the cut surface and ligated. (Fig. 2, *c*.) Again, in wounds of excisions of a portion of a surface, they recommended a continuous suture with a gauze packing below. (Fig. 2, *d*.)

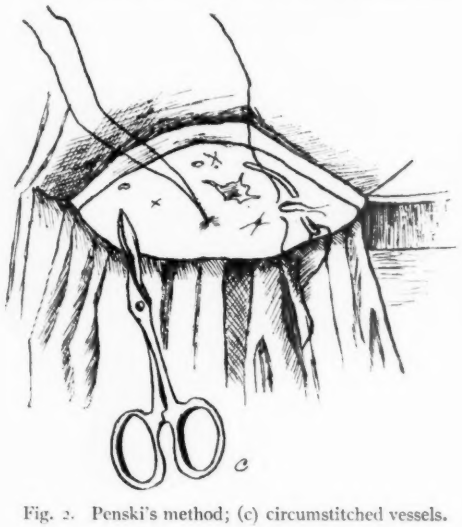


Fig. 2. Penski's method; (c) circumstitched vessels.

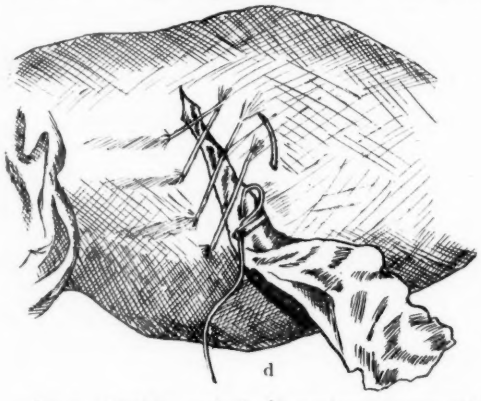


Fig. 2. Penski's method; (d) continuous suture with gauze packing.

This method did not come into general use until 1896, after its publication in *Révue de Chirurgie*.

In 1894 (21), Snegirew brought out his method of steam as a hemostatic, and advocated its use in operations on parenchymatous organs. The brilliant results which he himself claimed to have obtained have not been equaled by others. Experimentally, it has failed to stop the hemorrhage from larger vessels, and the parenchymatous oozing can be readily stopped by simpler methods—suture, tampon, etc.

Ceccherelli and Bianchi (22), in 1894, used whalebone, and later decalcified bone plates on the upper and lower surfaces of the liver, and then sutured through them, leaving the

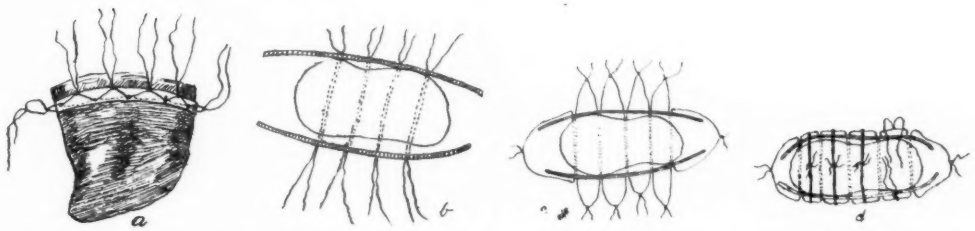


Fig. 3. Ceccherelli and Bianchi's method. (a) Whalebone, perforated, sutures passing through; (b) section of liver showing sutures and plates; (c) same with knots tied; (d) ends of ligatures tied on raw surface.

ends long and ligating them over the cut surface. (Fig. 3, *a*, *b*, *c*, *d*.)

Auvray (23), in 1897, after resecting V-shaped portions during experimental work upon animals, used a suture which is shown in Fig. 4, *a*, and claims to have an advantage over Kousnetzoff and Penski, because there is only one thread in the needle-canal. I fail to see any advantage whatever in this method. However, Auvray did improve the technique, not by his special suture, nor by circumstitching each divided vessel twice, but by reducing the size of the raw surfaces by sutures (Fig. 4, *b*), thus attempting to establish the continuity of the surface. This was done without packing, an advantage over Kousnetzoff and Penski.

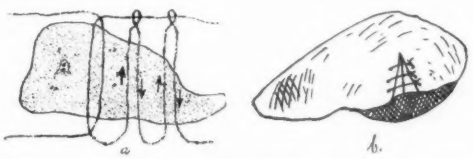


Fig. 4. Anvray's method. (a) Suture single thread; (b) reducing size of raw surface of liver by sutures.

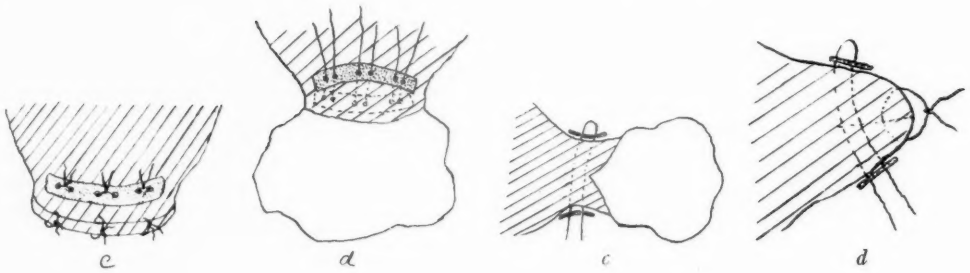
Holländer (24), also in 1897, removed a carcinoma of the gall-bladder which had extended to the liver, by applying compression clamps, excising a portion of the liver, and stopping the hemorrhage by the use of hot air. After this the clamps were removed and a small tampon applied. This is the first case in which hot air was applied, but here, as usual, other methods were also used.

In 1902, Carl Beck (25), in his experiments upon animals, devised an ingenious method of liver hæmostasis. To quote his own words, it consists of the following: " From each border of the incision into the abdomen we slit up a broad band, including the peritoneum, the fascia, and in some cases also the muscle. This strip was left attached at one end to the abdominal wall. These strips were used as supporters for the suture material by encircling the liver with them where the sutures were intended to be placed, and the catgut sutures were passed through these strips and tightly drawn."

In 1902, Kocher (26) used a large pair of compression forceps, crushing the liver substance. These were removed after twenty-four hours, with good results. The objection to this method is that it necessitates an open abdominal wound.

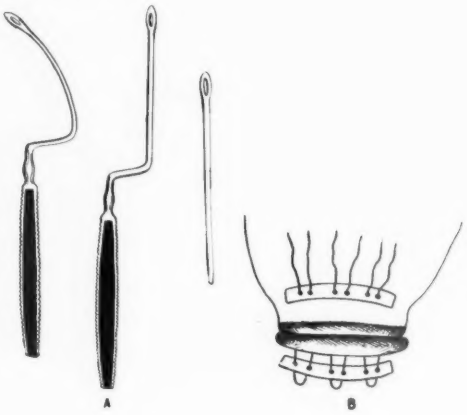
In April, 1905, Cullen (27) resected a portion of the liver, making use of mattress sutures, placing them 1 cm. from the line of section. " Each overlapped the other, so that every particle of liver substance was controlled. (See Fig. 5, *a*, *b*.) Pagenstecker sutures were used, reinforced by catgut where necessary. The large vessels were readily picked up with forceps and tied freehand. After all the sutures had been tied and lifted up, *a* and *b* tended to come together. Beginning at *c*, correspond-

Fig. 5. Cullen's method. (a) Cross section of liver with sutures overlapping; (b) mattress suture ligature and several coaptation sutures applied.



ing opposite sutures were drawn across and tied to each other. The approximation was good, but not quite so accurate as one would infer from the sketch."

In the same month, Payr and Martina (28) operated on a case of carcinoma of gall-bladder and liver. They resected a portion of the liver with Paquelin cautery and then brought the raw surfaces together by using magnesium plates. Catgut sutures were passed back and forth through the plates and the liver with the aid of a modified Kousnetzoff needle. (See Fig. 6, *a*.) They cut out wedge-shaped portions of the liver and placed the plates and sutures in such a manner that after ligating there was perfect coaptation of the raw surfaces. (See Fig. 6, *b*, *j*.) Magnesium plates are absorbable. During the process of absorption, many small gas-tumors were formed, which did not create any disturbance.



In July, 1905, Dr. Jacob Frank (29), in experimental work along this line, developed a method of suturing the liver after resection. His object was to "find a method whereby large liver wounds could be successfully managed with the suture alone, re-establishing the continuity of the organ, completely controlling hemorrhage, and closure of the abdomen." His method is as follows: After excising a large wedge-shaped portion of the liver, "the two broad raw surfaces left by the removal of the wedge-shaped piece are now converted into troughs. This is accomplished by the excision of wedge-shaped pieces, the troughs thus formed each having two flaps. (Fig. 7, *a*.) When the operation is completed, the raw surfaces of the original V left are transformed

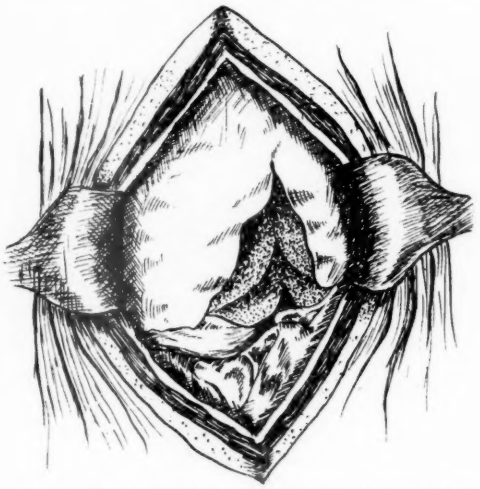
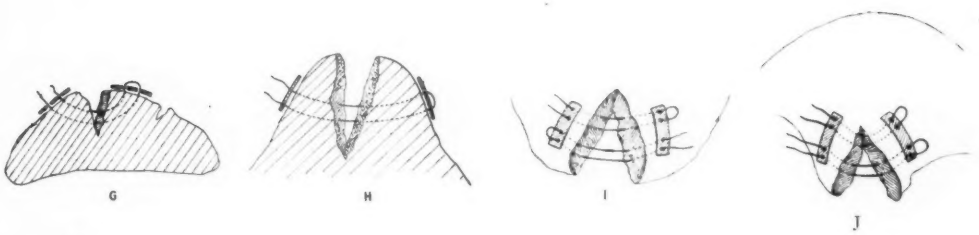


Fig. 7. Frank's method. (a) Wedge shaped pieces excised.



into smooth continuous liver tissue, assuming the form of liver borders, and the V-space left persisting as a notch. (Figs. 7, *b*, *c*.) This method of incising the liver facilitates easy suturing."

From the fact that so many methods and modifications of methods of controlling hemorrhage of the liver have been advocated, and also from the fact that in most of the cases operated upon for tumors or wounds of various kinds, combinations of three or four methods have been resorted to, we must infer that there is no one method which can be relied upon for all occasions.

The methods most commonly combined are the actual cautery, suture, and tampon. Of these, the suture has been used over absorbable and non-absorbable materials, as compressing agents or as coaptation suture. In clean cases the method which will permit perfect hemostasis, good coaptation, and a return of the organ to the abdominal cavity is the ideal one, and will probably be found in some form of mattress suture to control the hemorrhage, and circumstitching, after Kousnetzoff and Penski, and a beveling of the raw surfaces, after Frank, and a coaptation suture, and a closure of the abdominal wound. The ease or difficulty of this procedure depends upon the location of the lesion. Cases where this method might be employed would be tumors and subcutaneous ruptures requiring the removal of considerable liver tissue.

In 1900, a case came under my observation of a gunshot wound of the right lobe of the liver, produced by a 44-caliber revolver, which

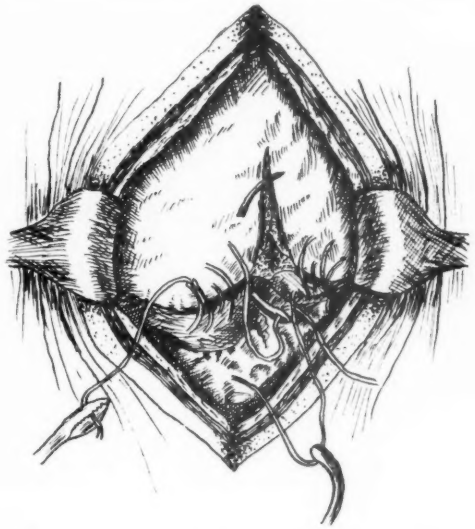


Fig. 7. Frank's method. (b) Sutures applied (continuity established).

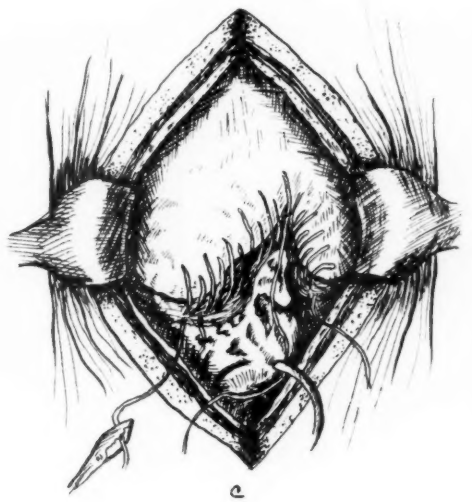


Fig. 7. Frank's method. (c) Sutures applied (continuity established).

bored a hole three quarters of an inch in diameter through the thickest portion of the liver. An incision was made along the external border of the rectus muscle, sufficiently large to expose the field of operation. The right costal arch was retracted upwards and outwards firmly. The left hand was passed over the dome of the liver, which was pulled down into the wound. An attempt was made to stop the profuse hemorrhage by gauze packing, which was unsuccessful, whereupon a small rubber bag was secured. A firm rubber tube (Fig. 8, *a*) was placed beside it, and inserted in the canal.

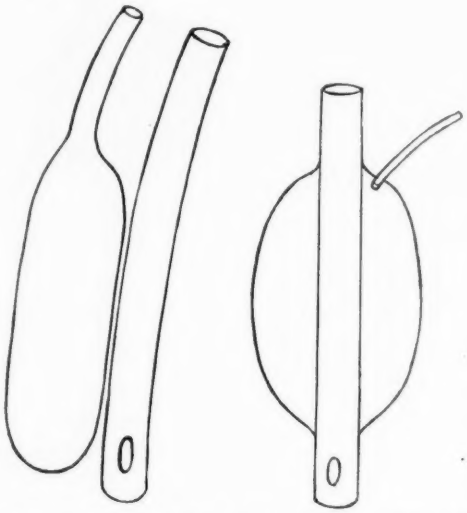


Fig. 8. Rubber bag and drainage tube at side; (b) rubber bag and drainage tube passing through middle.

The bag was inflated and the hemorrhage controlled. Packing was placed at the lower border of the liver to wall off the general peritoneal cavity as much as possible, and guard against infection of the same. The ends of the gauze packing, tube, and rubber bag were brought out at the upper angle of the wound, close to the costal margin. The remaining portion of the incision was closed by figure-8 silkworm-gut sutures.

A mild infection followed, but drainage from the tube was free. After seven days the bag, tube, and gauze were removed. Patient made a complete recovery at the end of four weeks. The bullet lay in the back under the skin, and was subsequently removed.

Upon reflection, it occurred to me that a tube resembling a Trendlenburg tampon canula would be better, having a large rubber tube passing through the center of a rubber bag, the latter having a small tube attached to it for inflation. (Fig. 8, *b*.) The central tube is essential for draining the retrohepatic space, because a large percentage of these cases become infected.

Twice I have had occasion to suture the liver after cholecystectomy. In both instances the suture was carried on a large non-cutting, curved needle, back of the raw surface. Hemorrhage was stopped without difficulty. Patients recovered.

On six different occasions superficial sutures were used in dealing with non-extensive subcutaneous ruptures and stab wounds, and hemorrhage readily controlled.

REPORT OF A CASE OF ADENOCARCINOMA OF THE LIVER — RESECTION — TEMPORARY RECOVERY — DEATH NINE MONTHS LATER FROM RECURRENCE

Family History. — Negative.

Personal History.—Patient, 31 years of age; married eight years; weight, 135 pounds. Had always suffered more or less from asthma. Otherwise had enjoyed good health. Had three children, all living and well.

Present Illness.—Began in January, 1904, when she noticed a slight tenderness in the right hypochrondriac region, which gradually increased until she was obliged to discard corsets. The pain continued to increase, radiating upwards and laterally from the right hypochondriac region to the right shoulder and epigastrium. About March 1st she began to complain of fullness in the abdomen, and upon being examined by her husband (a physician) a tumor was discovered. The growth of this was quite rapid, and the pain necessitated the use of morphine. Temperature normal. General condition good.

On March 22d, while on a sleeper, she was seized with a sudden pain in the same region as before. Following this she felt herself getting weaker. On March 24th she arrived at the hospital, and the findings were as follows: Patient well nourished, but pale; mucous membranes blanched. Heart and lungs normal. Abdomen, on inspection, showed a prominence in right hypochondriac region, which moved with respiration. On palpation, a hard, firm mass, about the size of an orange, was felt, which seemed to be attached to the liver. On percussion, dullness was found over the tumor. No thrill. Some free fluid in the abdomen.

Spleen findings normal.

Vaginal examination negative.

Symphatic system negative.

Fig. 9. Liver with tumor in right lobe.
A. Line of mattress sutures to control hemorrhages.
B. Tumor.

Urine normal.

Blood count: Erythrocytes, 3,600,000; leucocytes, 20,000; hæmoglobin, 70 per cent.

Temperature, 99°; pulse 84; respirations 24.

Diagnosis: Probable tumor of liver.

Operation, March 25th.

Inasmuch as the diagnosis was uncertain, the incision was made over the middle of the tumor, which happened to be along the external border of the rectus muscle. On entering the abdominal cavity, the free fluid was found to be blood. On further investigation the tumor was found to be situated in the lower portion of the right lobe of the liver, with a small opening in its most prominent part, from which the hemorrhage had occurred. In consistency, it was firm and covered with liver tissue. Further investigation showed an absence of any other nodules, either in the liver or in any of the glands. The incision was promptly enlarged by cutting through the costal margin. A retractor was inserted in the upper outer angle of the wound; the left hand was introduced over the dome, and the liver pulled down and held by an assistant. Paquelin cautery was called for and used until an incision about an inch long had been made, when it was discarded because of the slowness of the procedure. A long heavy needle, armed with No. 3 catgut, was taken and mattress sutures introduced about 1½ inches above the tumor, beginning at the left of the gall-bladder and extending upwards and outwards to the right border. (Fig. 9.) The gall-bladder was clamped with artery-forceps above and below the line of suture, which was within a half-inch of the common duct. Now, with a knife, an incision was made on the anterior surface and one on the posterior, in such a manner as to leave anterior and posterior flaps, which were brought together by coaptation catgut sutures. A silk purse-string suture was placed around the stump of the cystic duct and the end invaginated. Blood was removed from the abdomen by sponges, and the abdomen irrigated with normal salt solution and the abdominal wound closed.

Excepting for a slight cough which developed, the patient had an uneventful recovery, leaving the hospital on the fifteenth day.

The cut surface of the piece removed was 15 by 8 cm. at its thickest portion.

Pathological Report

Microscopically, there was nothing to be seen on the surface of the specimen except an opening about the size of a split pea, where spontaneous perforation took place. On cutting through the middle of the tumor, it was found to be well surrounded by liver tissue, excepting on the anterior surface, in the region of the perforation, where the liver tissue was thinned out. In the center of the tumor was a cavity, about the size of a walnut, containing a grayish degenerated material. The tumor was not encapsulated, but extended diffusely into the liver tissue. A number of bile tracts contained plugs of this grayish substance.

Microscopic Examination

Microscopic examination showed the tumor to consist of epithelial cells much smaller than normal liver-cells, and resembling bile-duct cells. The histological arrangement at the border of the tumor is that of an adenoma. Farther in, it assumes the character of a carcinoma; therefore I feel justified in diagnosing it an adenocarcinoma, probably originating in the bile-tracts.

Nine months later the patient died from a recurrence of the disease in the general peritoneal cavity. The liver was free (according to her husband's statement) from any intrahepatic involvement, but its surface was studded with numerous growths. The other abdominal organs were similarly affected, showing that the rupture had permitted carcinoma cells to be implanted freely throughout the abdominal cavity.

Animal Experiments

Animal experiments have been made and a a number of different methods tried. During these experiments it occurred to me that ordinary tendon, obtainable at any meat-market, might be used in place of decalcified bone, magnesium plates, etc. The tendon was boiled, and it was found that it would become from one third to one half shorter and considerably thicker and wider, and still remain firm; that mattress sutures could be sewed through this tendon and the hemorrhage controlled. The tendon becomes absorbed in the course of time.

BIBLIOGRAPHY

1. Auschutz. Willy über die Resection der Leber, Sammlung Klin. Vortrage. N. F. Nr. 356–357, 1903.
2. Fabricius Hildanus. Cit. Gurlt Geschichte der Chir., bd. iii, S. 722, 1898.
3. Mayer, L. Die Wunde der Leber und Gallenblase, 1872.
4. Holm. Loc. cit., Auschütz.

5. TERILLON. Recherches expérimentelles sur la réparation du foie. Arch. de Physiol., 1875.
6. TILLMANNS. Experimentelle und anatomisch Untersuchungen ueber die Wunde der Leber und der Niere. Virchow's Archiv., bd. 78, 1897.
7. ESCHER. Cit. Auschütz.
8. LANGENBUCH. Berl. Klin. Wschr., 1888, Nr. 3.
9. BURKHARDT. Beit. z. Behandlund der Leber Verletzungen. Centralbl. f. Chir., S. 88, 1887.
10. GLUCK. Verhandlungen der Deutschen Gesellschaft f. Chir., 1890.
11. PONFICK. Experimentelle Beit. z. Pathologie der Leber. Virchow's Archiv., bd. 118–119, 1889, 1890, 138 Supplem., 1895.
12. LORETA. Loc. cit., Auschütz.
13. POZZI. Gazette Médic. de Paris, 1888.
14. TILLMANNS. Verhandlungen der Deut. Gesellschaft f. Chir., 1890.
15. TERILLON. Bull. de l'Acad. de Méd. de Paris, 1890.
16. CLEMENTI. Central. Bl. f. Chir., 1890.
17. ULLMANN. Ueber Leber Ges. Wiener Med. Woch., 1892, 52, Nr. 47.
18. DOYEN, E. Arch. Provinciales de Chir., tome i, No. 2, 1st Aout, 1892, p. 163.
19. ISRAEL. Extirption eines primären Leber Sarkoms. Deut. Med. Woch., S. 665, 1894.
20. KOUSNETZOFF ET PENSKI. Revue de Chir., 1896.
21. SNEGIREW. Dampf als Blutstillungsmittel. Deut. Med. Woch., S. 747, 1894.
22. CECCHERELLI E BIANCHI. Nuovo processo di sutura per l'emistasi del fegato. XI Internat. Congress, Rome, 1894.
23. AUVRAY. Déscription d'un nouveau procédé de resection du foie. Rev. de Chir., 1897.
24. HOLLANDER. Extirpation der Gallenblase nebst querer Resecktion d. Leber. Verhandlungen der Deut. Gesellsch. f. Chir., 1898.
25. BECK, C. Surgery of the Liver. Jour. Amer. Med. Ass'n, vol. xxxviii, p. 1063, 1902.
26. KOCHER. Chr. Operations lehre, vierte aufl., S. 348, 1902.
27. CULLEN. Large carcinoma of the Liver, etc. Jour. Amer. Med. Ass'n, vol. xliv, 1239, 1905.
28. PAYR AND MARTINA. Experimentelle und Klin. Beit. z. Leber naht und Leber resection. Archiv. f. Klin. Chir., bd. lxx, 77, S. 962, 1905.
29. FRANK, J. Incising and Suturing of the Liver: A New Method to Re-establish a Continuity and for the Control of Hemorrhage. Jour. Med. Ass'n, vol. xlv, 45, p. 446, 1905.

COOK COUNTY HOSPITAL

Department of Surgery

TREATMENT OF FRACTURES OF THE FEMUR AT THE COOK COUNTY HOSPITAL

BY CHARLES DAVISON

Professor of Surgery and Clinical Surgery, University of Illinois; Attending Surgeon, Cook County Hospital and the West Side Hospital of Chicago; Interne Cook County Hospital, 1884

FOR clinical purposes, fracture of the femur may be divided into four groups.

First. Fractures above the small trochanter. This includes fractures of the head, neck, and greater trochanter.

Second. Fractures immediately below the lesser trochanter, where the lower part of the small upper fragment is displaced forward and outward and rotated outward by the action of the iliopsoas muscle.

Third. Supracondylar fractures, in which the small upper end of the lower fragment is tilted backward by the action of the calf muscles.

Fourth. Fractures of the shaft of the femur that can be reduced by manipulation and direct extension.

First. Fractures above the lesser trochanter may be impacted, and when so held, it is of vital importance that the impaction should be allowed to remain intact.

No unnecessary examination, no attempt to find abnormal mobility or crepitus should be made, as such manipulation would endanger the separation of the impacted fragments.

The diagnosis of impaction must be made from the symptoms and deformity.

Fractures of this part of the femur have three cardinal symptoms, by which the diagnosis should be made:

1. *Loss of function* of the whole extremity.
2. *External rotation* of the leg and foot.
3. *Shortening*, located at the neck by Bryant's iliofemoral triangle or Nelaton's line.

If the shortening is less than one inch, it is fair to presume that the fracture is impacted, but if the shortening is more than one inch, that the fracture is not impacted.

When possible, the diagnosis should be verified by the fluoroscope.

Impacted fractures of the femur above the lesser trochanter should be treated by simple immobilization in the impacted position, without attempting to remedy the deformity.

The simplest form of immobilization is the body plaster cast. (Fig. 1.)

The body cast can be made strong and reasonably light by the incorporation of basswood strips between the layers of plaster at the places where strength is needed.

Unimpacted fractures of the same region are well treated by the Liston splint.

The Liston splint of the proper size for an adult man consists of a board four feet long, four inches wide, and seven eighths inches thick, to the lower end of which a crosspiece twenty inches long is securely fastened. A series of holes in pairs are bored at the upper end, and in the crosspiece for the attachment of the extension bands. (Fig. 2.) Strips of adhesive plaster are attached to the leg, similar to Buck's extension, except the plaster below the foot on each side is rolled into a rope for attachment to the crosspiece of the splint.

The splint, carefully padded to fit the irregularities of the leg and body, is applied to the injured member.

It is fastened in position at the ankle, knee, and body by temporary bandages.

The extension adhesive plaster strip cords

Fig. 1

Fig. 2.

Fig. 3

Fig. 4

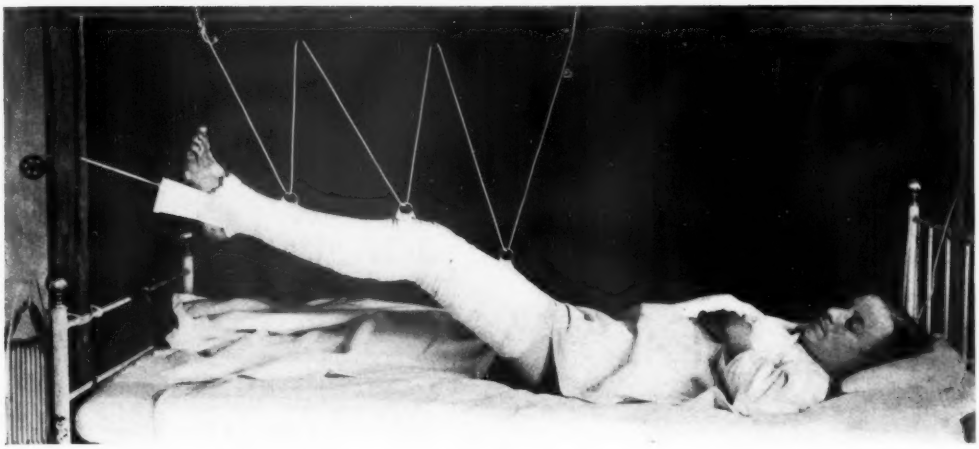


Fig. 5

are tied through such holes in the crosspiece as will give the foot and leg the proper amount of rotation.

The foot must not touch the crosspiece.

A well-padded perineal band is placed in position and the ends passed through that pair of holes, in the upper part of the splint, which will give good direction for traction with the perineal band.

The patient anæsthetised, traction is made by an assistant on the crosspiece of the splint, and when the limb is stretched to the same length as the normal leg, as shown by actual measurement, the perineal band is tied to the upper part of the splint holding the fractured bone in extension. (Fig. 3.)

Fig. 6

The splint is carefully bandaged to the limb and body with starch bandages, leaving the anterior superior spine and the internal malleolus exposed for daily measurements, and tightening the extension when necessary. (Fig. 4.)

This makes the extension entirely within the splint, and the patient can be moved about and changed without disturbing the extension and interfering with the partly healed union.

Second. In fractures immediately below the lesser trochanter, the lower end of the upper fragment is displaced by the action of the iliopsoas muscle which is attached to the lesser trochanter.

The upper fragment is rotated outward.

The lower end of the upper fragment is flexed and abducted. (Fig. 4.)

The action of the muscle is so powerful and the upper fragment so short, that the fragment cannot be replaced and held in position by any splint.

The usual methods of treatment by long splints and extension always give union with angular deformity and faulty rotation.

Fig. 7

The indication for treatment is to place the long lower fragment in such a position that its axis will be in line with that of the upper fragment, and with the same amount of external rotation.

This can be accomplished by suspension of the leg in the proper position in a frame by the Beely anterior molded plaster splint and Buck's extension. (Fig. 5.)

A Buck's extension is put on the leg, the knee is slightly flexed, and a splint is molded to the anterior part of the leg and thigh, with wicking soaked in plaster cream and secured with a roller bandage.

A series of rings are incorporated into the splint for suspension of the limb.

The rings should be in such a position as to get the necessary rotation of the lower fragment to match the faulty rotation of the small upper fragment when the leg is suspended.

The leg is suspended sufficiently high to equal the flection of the small upper fragment.

Fig. 8

Fig. 9

The frame is attached to the outer part of the foot of the bed in such a position that the lower fragment will be in the axis of abduction of the small upper fragment. (Fig. 6.)

Sufficient weight on the Buck's extension will overcome the shortening.

When the immobilization is completed, the reduction of the fracture should be verified by the fluoroscope.

Third. Supracondylar fractures are best treated by the double inclined plane. (Fig. 7.)

The small lower fragment is flexed upon the leg by the action of the gastrocnemius muscle. (Fig. 12.)

To reduce the fracture, the leg must be flexed upon the thigh until the lower fragment takes the same axis as the upper fragment.

The limb should be placed well padded in the double inclined plane and the angle of the splint changed until the fragments are in the same line.

The weight of the body pulling against the fixed flexed knee will produce sufficient extension.

To locate the proper angle, reduction should be performed with the aid of the fluoroscope.

Fourth. Fractures of the shaft that can be reduced by direct extension may be treated by the Liston splint, applied in the same manner as for impacted fractures of the neck of the femur, with the addition of a small posterior coaptation splint to prevent sagging of the ends of the fragments.

In children this class of fracture is more easily kept clean by the use of Schede's vertical suspension. (Fig. 8.) Sufficient weight should be applied to lift barely the nates, so

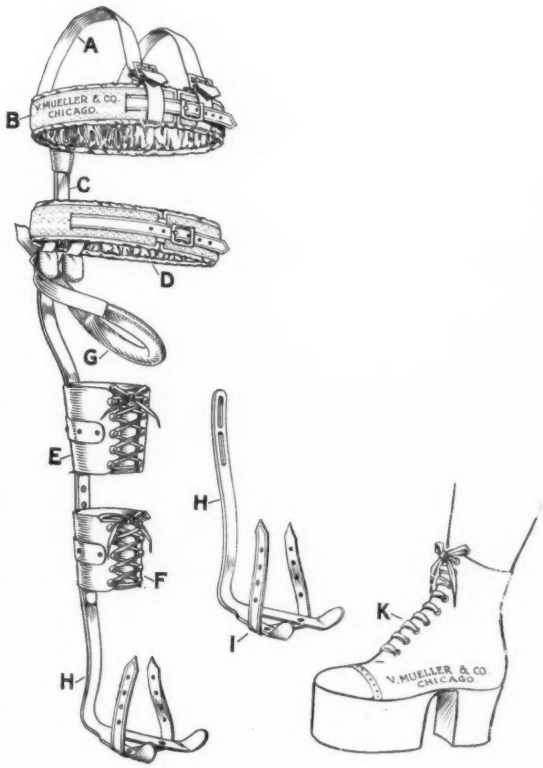


Fig. 10.

A. Shoulder straps.
B. Band around chest.
C. Strong iron from scapula to middle of calf.
D. Pelvic band.
E. Leather band laced around thigh.
F. Leather band laced around calf.
G. Perineal strap. Water pad for extension.
H. Detachable nurse for traction on shoe by buckles and straps, and to fix rotation of limb.
I. Straps to connect with buckles on shoe for extension.
K. Shoe with cork sole for elevation of well limb.

Fig. 11. Fracture of shaft of femur immediately below insertion of tliopsoas muscle.

that a bedpan can easily be used without disturbing the fragments.

The patient with any fracture of the femur should be kept quiet in bed until all inflammatory reaction from the injury subsides, and until union has so far advanced that the ends of the bones will remain in apposition without extension.

After that time the patient can be up on crutches in a body cast with a high heel on the opposite foot.

Or, much better, the patient may be up and about during convalescence, supported by an ambulatory splint with crutches or only a cane. (Fig. 9.)

Sometimes, in old persons, it becomes necessary to get them out of bed at once, to avoid death from nervous collapse or from hypostatic pneumonia.

Under any circumstances when it becomes necessary to get the patient up at once, an ambulatory splint may be used.

An ambulatory splint can be used in bed in place of the Liston splint, filling the same indications. Extension is obtained by attachment of an ordinary shoe to the footpiece, and counter-extension by a perineal band. (Fig 10.) Good results are obtained only by the intelligent, careful, painstaking application of the means at command, whether it be an old board and a broken saw, or the paraphernalia of a metropolitan hospital.

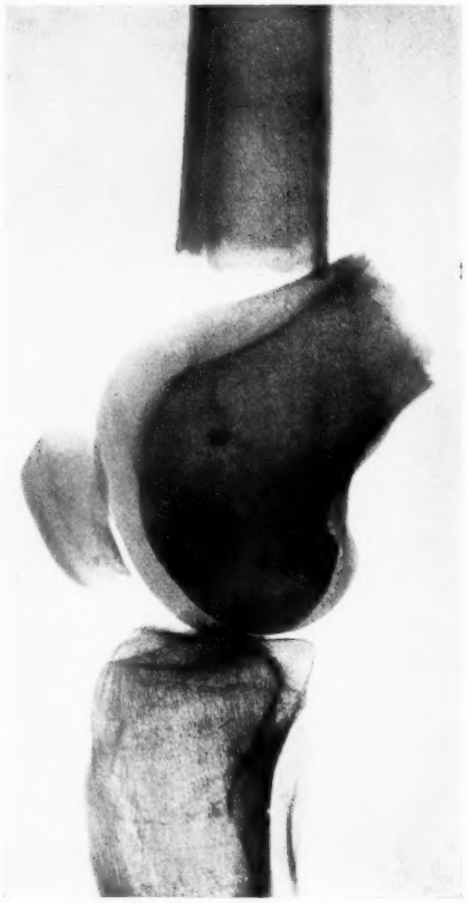


Fig. 12. Supra condylar fracture of femur.

RETROPERITONEAL HERNIA[1]

By L. L. McARTHUR

Interne Cook County Hospital, 1881; Attending Surgeon, St. Luke's Hospital, Chicago, and Michael Reese Hospital

IT occurred to me that I might be justified in presenting the details of a unique case, brought to me by the courtesy of a friend, in which neither of us was able to make an accurate diagnosis before laparotomy, and then only after a most exhaustive search through the abdomen.

I will give the history of the case first, and then make some remarks on the points which the case has stamped indelibly on my memory.

L. D., aged 6 years, entered St. Luke's Hospital December 13, 1903, at 11 P. M. Complains of—1. Pain in abdomen; 2. Vomiting; 3. Passing of blood.

Present History.—Child is a schoolboy, and was attending school daily at time illness came on, which was probably December 9th. On that day boy looked badly, dark about eyes, indisposed, etc., and had frequent bowel movements.

But before this his mother gives for him a history of frequent bowel movements, which began two weeks before the day mentioned above as the first day of present attack—five to eight movements for five days. There was no pain during these prodromic attacks.

Bowel movements which came at beginning of present attack: 1. Three to four a day; 2. Contained mucus; 3. Slight movements; 4. Much flatus; 5. Pain after first two days on passage.

There was pain on first day. On the second day, as boy was going to city with his mother, he had his first attack of pain: 1. Sudden; 2. Severe; 3. Duration 3 minutes; 4. Interval 45 minutes; 5. Position left side.

There was no vomiting on second day.

There was perhaps a slight redness about the stool on second day.

Third day showed pain: 1. More severe; 2. Intervals less until afternoon, when pain seemed to get better.

Besides pain on third day, boy vomited: 1. Yellow at first, then green; 2. No odor; 3. Undigested; 4. Times frequent; 5. One hour after feeding; 6. No effort to expel food; 7. No pain or sickness during spells.

On third day there was blood in stool. Movements on this third day few,—of bloody mucus.

Boy slept night of third day, and on fourth day pain and vomiting both returned.

No bowel movement on fourth day.

Afternoon of fourth day, boy started from his home to hospital. During the trip of two hundred miles, boy did not vomit, but pains in abdomen continued. At eleven o'clock same night he was operated.

Past History.—Measles and whooping-cough. Appetite good, irregular, not sensible—pies, sweets, no meat or milk. Digestion good; breath bad lately. Bowels usually regular, sleeps well.

White-blood count, 18,720.

Operation.— Reduction incarcerated loop and appendectomy. Time, 37 minutes.

1. Usual prep ration.

2. Median abdominal incision, which was later elongated.

3. Bowels removed from cavity and all loops freed.

4. Appendectomy. (*a*) Meso-appendix clamped, ligated, and cut. (*b*) Circular incision about appendix; peritoneal cuff reflected; appendix excised, cauterized with carbolic acid. (*c*) Cuff sutured over stump with silk. (*d*) Purse-string suture of silk closed over invaginated stump.

5. Bowels replaced, peritoneum irrigated with normal salt solution, and closed with continuous catgut.

6. Skin closed with interrupted silkworm gut.

7. Thiersch powder and dry dressings.

Pathology.—Hernia in fossa of Treitz; incarceration of loop of jejunum; no strangulation of same.

Urine Examination

Specific gravity	1014.
Reaction	Acid.
Color	Light yellow.
Albumin	Absent.
Indican	Absent.
Bile	Absent.
Sugar	Absent.

Microscopic Examination

Blood	Absent.
Pus	Absent.
Epithelial cells	Occasionally flat as well as present.

Temperature Chart

Admitted: Rectal temperature, 100.

Second day: Temperature, 101; pulse, 116; Respiration, 24.

Third day: Temperature, 100; pulse, 98; Respiration, 22.

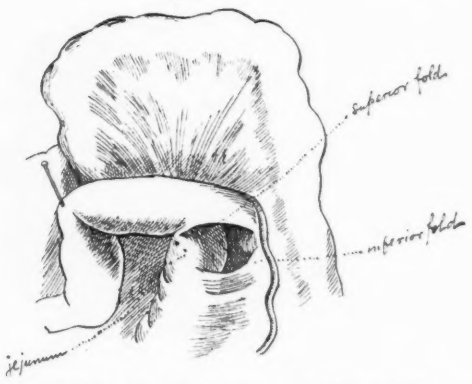
Fourth day: Temperature, 99.6; pulse, 94; Respiration, 24.

Pulse and temperature dropped to normal in two or three days, and remained so until his discharge from the hospital, December 31, 1903.

After a careful study of the history of the case, it appeared to us probable: 1. That there existed an acute intestinal obstruction; 2. That this could be due either to a mechanical or an infective inflammatory cause; 3. That only an explorative laparotomy could decide the ques-

[1] Read before the Southwestern Iowa Medical Society.

FIG 1



Fossa of Treitz with two duodenal folds which enter into its formation. Note absence of vessels in the folds. — After Moynihan.

Specimen 1279, St Thomas's Hospital Museum, representing a left duodenal hernia, from Moynihan. In the margin of the orifice the inferior mesenteric vein is distinctly seen.

tion, and offered the better chances for the child. In favor of the mechanical nature of the obstruction was the somewhat gradual onset of the obstructive symptoms without high fever, and with the appearance of blood and mucus in the stools, the blood count, while elevated (18,000), not being high enough to be convincing as to the presence of pus. Because of the tenderness over the whole abdomen, the sudden sharp exacerbation of the pains on the second day, and some rise in temperature, the attention was naturally directed to the appendix, but without other corroborative signs. It was therefore deemed advisable to make a median incision in order that all portions of the abdomen might be reached. Examination of appendix revealed only sufficient injection and swelling of same to make it suspicious. It was therefore removed while in hand, and the search continued. Both inguinal rings were free, as were femoral and umbilical sites. No bands, no Meckel's diverticulum, no adhesions were to be found; no volvulus, no intussusception, no peritonitis. The lower ileum was small and collapsed, the upper ileum and jejunum fairly but not tensely dilated, nor the vessels here injected. Following up the evisceration in the endeavor to find the point of obstruction, almost the entire small intestines were removed from the abdomen, before a loop, itself small, was found which led to a point where the distension began. This was situated at the point where the duodenum joins the jejunum at the level of the third lumbar vertebra, the very act of search dislodging the knuckle of intestine from the small fossa here situated, and the intestinal contents began to gurgle past the point till then collapsed. The entire intestinal tract, having thus been gone over loop by loop, and the sole visible obstruction having been relieved, was replaced in the abdomen, and the coils washed with normal salt solution, of which considerable was left in the abdomen. The patient made a simple uneventful recovery, returning home on the eighteenth day.

I naturally then began a search of the literature for enlightenment on the nature of these rare retroperitoneal herniæ to find the following, to me, instructive, interesting, and important facts:

First, that to Treitz (1875) is due the credit for first emphasizing the importance of certain folds and fossæ in the posterior abdominal surface, particularly in relation to their causation of fatal internal herniæ. He placed on a definite anatomical basis their origin, location, and occurrence, at the same time presenting an illustrative case.

Second, that, ten years later, Waldeyer, in a series of 250 consecutive examinations, demonstrated that the fossa of Treitz exists in 73 per cent of all cases.

Moynihan, in his work on *Retroperitoneal*

Hernia, has so completely covered the subject that I herewith make full acknowledgment, and from his writings shall quote freely.

Moynihan says: "If in a body with a normal peritoneum one lifts up the great omentum and the transverse colon, and pushes over to the right the mass of small intestines, there will be seen on the left side of the duodenojejunal flexure a peritoneal fold. This varies in shape and size. Most frequently it is semilunar, the thin concave edge looking upward and to the right (of the subject) and surrounding the bowel at the level of the flexure. The upper horn of this semilunar fold is blended with the inferior layer of the transverse mesocolon, and especially at the point where the inferior mesenteric vein passes beneath the pancreas. The larger lower horn is continuous on the inner side with the peritoneal investment of the duodenum, and at the outer end with the peritoneum of the transverse and descending colon. In the upper horn, at a variable distance from the edge, lies the inferior mesenteric vein, forming an arch with the convexity looking upward and to the left. The lower horn is less distinct, composed exclusively of two layers of peritoneum, and, at some distance from its free border, one sees the inferior mesenteric artery and its branch, the left colic. From the relative position of these two vessels there results a vascular arch (always referred to now as the arch of Treitz), which surrounds the fold in question. Behind this peritoneal fold—between it and the duodenum—there exists necessarily a depression or pocket in the form of a funnel, the summit of which is directed towards the duodenum. The orifice of entrance is semilunar, limited on the right by the flexura duodenojejunalis; on the left by the free border of the fold. The fossa is, in general, situated on the left side of the third lumbar vertebræ."

Moynihan, in his elaborate monograph on this subject, has carefully gone into the description of the several folds and fossæ (nine in number) which anatomists and pathologists have described as furnishing the potentialities of an internal hernia. After a careful study of these, and painstaking investigation of the various reported cases, as well as museum specimens—of which I submit certain drawings for your inspection—he has concluded, I think with justice, that but two of these are of great practical interest to us as medical men, since, of all the reported cases, they alone seem to have constituted their sac of origin. A practical way to remember them is that they are formed by folds of peritoneum, *which envelop* the (1) inferior mesenteric vein, the fossa of Landzert, and (2) the superior mesenteric artery, the fossa of Waldeyer. When one lifts to the right all the small intestines after having raised the omentum and transverse colon, there is to be seen the plica venosa, which surrounds the inferior mesenteric vein, producing a fossa which looks to the right and upward. Somewhat more distant from the edge of this fold can be felt the left colic artery. Since in every one of the specimens examined and in *all* the reported cases this vein has been found to exist in the margin of sacs examined, I believe he is justified in the conclusion that the teachings of Treitz are in error so far as the fossa of that name being the usual site, since no vessels exist in the folds which enter into its composition, but that they do answer the conditions required by the fossa of Landzert. Thanks to his industry, up to 1899 some 57 cases had been collected of this type. Because this fossa is situated on the left side of the body and to the left of the duodenum he has proposed the term "left duodenal hernia" to take that of its many synonyms. When, on the other hand, that fossa created by the infolding of the peritoneum about the superior mesenteric artery, known as the fossa of Waldeyer, becomes the site of herniæ, they in their development lie to the right of the duodenum, and hence have been called by Moynihan "right duodenal hernia." In this variety there always exists in the neck of the sac the superior mesenteric artery. As to the size of these hernia, it is stated that they may vary from that of a walnut to a tumor containing the *entire small intestine*. When the latter is the case, one can judge of the astonishment of the operator, on opening the abdomen, to find an apparent absence of small gut. On tracing the ileum from its junction with the colon, however, it may be seen to enter the coverings of a tumor, tympanitic in character, and containing the missing organs.

Now, it happens that almost all the specimens—most of which have been found at autopsy—have been of the large, chronic type; hence the study of the sac and its anatomic relations has been easy; but I doubt not that many a case of intestinal obstruction has occurred, in which competent men have operated, only to find no apparent mechanical cause for an evident obstruction, when, if the knowledge that these fossæ likewise are genuine potential dangers had been appreciated a more careful search might have revealed the obstruction, with relief to the patient. Moreover, I believe that as yet the long-existing, slowly forming retroperitoneal herniæ have been chiefly those to be put on record, while the smaller, more recent, acute type may from the very nature of the conditions have been most easily overlooked, or in the very act of search have been reduced.

It must be remembered that the contents of these herniæ are rarely adherent, are usually easily reduced, and never strangulated, so that, if small, they might never be recognized unless looked for.

The question naturally arises, What should be done to obliterate the fossa, once emptied of its contents? Whatever is done by the operator, one thing of importance to remember is the anatomic fact that the margins of the sac, of either the right or the left duodenal herniæ, contain vitally important vessels, to cut or ligate which would result in fatal gangrene of the intestines they supply.

REPORT OF A CÆSAREAN SECTION, WITH QUESTIONABLE INDICATION

By PALMER FINDLEY, M. D.

Assistant Professor of Obstetrics and Gynecology, Rush Medical College, in affiliation with the University of Chicago; Interne Cook County Hospital, 1895

AT no time in the history of Cæsarean section have the indications been clearly defined. There have always been, and there always will be, border-line cases in which the indication for abdominal or vaginal section is, at most, relative, and in which, whatever the result, there will be room for controversy. That the legitimate field for Cæsarean section is widening is unquestioned; a result of improved technique in operative procedures and the introduction of vaginal Cæsarean section. And it may be fairly stated that by virtue of these factors the dangers involved in this operation have been so minimized that the scope of relative indications has broadened disproportionately to that of absolute indications. In other words, the dangers of Cæsarean section, both to mother and child, have been so minimized in late years as to afford a greater freedom of choice in doubtful cases.

I report the following case as one in which the indication is questionable, not alone because Cæsarean section has rarely been performed for a similar indication; not that I have reason to deplore the outcome of the case, for the results were good in both mother and child; not that in the light of subsequent events I am persuaded that any other procedure would have been preferred: but rather because there must ever remain, not only in the mind of the critical observer, but in my own as well, the question as to whether it would have been possible to accomplish the delivery with less risk to the mother and child than was involved in the abdominal section.

Mrs. B., age 37, primipara, was admitted to the Presbyterian Hospital, Chicago, the night of August 14, 1905. This was her second pregnancy; she was at full term, and had been in labor 36 hours. Her first child weighed 7½ pounds and the labor was short, requiring no interference, and was followed by a normal puerperium. Two years later the vaginal portion of the cervix was amputated, and one year from the date of this operation she became pregnant. The course of this pregnancy was uneventful and continued to full term. She had been in labor 24 hours, when her family physician, being unable to locate the cervix, called in a neighbor physician. An anæsthetic was given, and for more than an hour the two physi-

cians searched with eyes, fingers, and probe for the cervical canal, and found none. It was then decided that a Cæsarean section would probably be necessary, and the patient was sent to the hospital 36 hours after the onset of labor.

I found her exhausted in strength, the uterine contractions had become weak and infrequent, the fœtal heart-tones were 160, strong and regular; the position was a right occipito-posterior, and the head was not engaged in the inlet of the pelvis. There was a bloody vaginal discharge, not large in amount. On vaginal examination, no cervix nor cervical canal could be palpated, the vaginal walls were very œdematous, and bled freely to the touch of the finger. Radiating throughout the vault of the vagina were dense scars. It was apparent that, because of the fatigue of the patient, the diminished uterine contractions, and the apparent futility in waiting for the cervix to dilate by natural forces, operative interference was demanded. I felt confident that with the patient anæsthetized and with a free exposure of the vaginal surface, I should be able to find the cervical canal, then to dilate it, or, at most, to perform a vaginal Cæsarean section. But, so great was the œdema and trauma, it was impossible for me to locate the cervical opening. Blood was freely oozing from innumerable points, and after searching for full 15 minutes, the maternal pulse had reached 130, the fœtal pulse 180, and the loss of blood had been great. The vagina was packed with gauze to control the bleeding, and an abdominal section was immediately performed. The usual technique of the Cæsarean section was carried out. The baby, which weighed 7½ pounds at birth, continued to thrive, and the mother left the hospital on the sixteenth day in a most satisfactory condition.

The question of removing the uterus after the delivery of the fœtus was decided in the negative, because the patient was in no condition to prolong the operation, and it was thought wise to trust to the drainage of the uterus through the vagina after the subsidence of the œdema. Had the uterus not drained, it was the intention to remove it when the condition demanded. A satisfactory drainage was readily established, and at no time were there signs of retention of the uterine secretion.

Two weeks after delivery a vaginal examination demonstrated a mass of dense scar tissue at the stump of the cervix, through which a small probe could be passed into the cavity of the uterus, and radiating in every direction in the vault of the vagina were scars so extensive as to obliterate all landmarks.

EDITORIALS

SURGERY, GYNECOLOGY AND OBSTETRICS

SURGICAL PUBLISHING CO. OF CHICAGO
103 STATE STREET - - - - CHICAGO

SUBSCRIPTION PRICE, FIVE DOLLARS PER ANNUM IN ADVANCE

Managing Editor - FRANKLIN H. MARTIN, M. D.
Associate Editor - ALLEN B. KANAVEL, M. D.

JANUARY, 1906

VOLUME TWO

Beginning with this our second volume, two important innovations are added to our original editorial plan.

I

The first is the addition of an editorial committee, secured from each of the most important medical universities of the country, to co-operate with the editorial staff of the journal in obtaining and editing the best material from their various centers.

1. There will be twelve of these committees. In the beginning, each committee will be encouraged to concentrate a certain amount of work on a particular month of the year, in the manner illustrated in this number of the journal by the committee from Cook County Hospital of Chicago. This will have the effect of stimulating a closer and more definite literary organization of the great surgical centers of the country, as there will be a distinct call for the output of each for publication in a suitable magazine at a prearranged time each year.

2. The committee may send material for any issue of the journal, and while the communication will be received and published as coming directly from the author, it will bear a legend which will stamp it as approved material from the editorial committee of the university whence it originates. This method of utilizing the work is illustrated in this issue in the articles by Dr. Van Hook and Dr. Davis, from Northwestern University Medical School and Jefferson Medical College, respectively.

In this arrangement, the journal will not limit the university committee to any one department of the magazine, but hopes to receive from the pens of the different members of the faculty, original communications, reports of cases, results of experimental research, editorials, abstracts of current literature (including abstracts of material published in the local bulletins), book reviews, and material for the Department of Technique. Thus when the committee takes full advantage of its opportunity, a distinctly local flavor will be imparted to the journal for that particular month, giving, in the course of the twelve months, interesting variety, from the editorial standpoint, and much valuable literary work from actual workers in surgery.

It is safe to assume that the products of the most valuable workers in scientific surgery are not the first to be proffered by their authors to medical publications. These various editorial committees will unearth this precious material, and rescue from obscurity the modest workers in experimental and practical research.

In organizing this important work, the editorial staff does not expect to relinquish the editorial supervision of the journal, nor in any way to lessen its general influence as an international magazine of surgery. The work of the editorial committees of the universities will be supplementary to the general work of

the journal. The normal size of the journal will be increased in order to accommodate the new material. Nor does the journal organization expect to supplant or in any way to minimize the influence of the local university bulletins. This arrangement will but supplement and make more attractive these publications to the members of the faculties, inasmuch as the journal will open its pages to abstracts of surgical material contributed to their pages and publish simultaneously with the bulletins the important original communications in full. This will give the contributors to the local publication all the advantages accruing to its circulation and influence, as well as the advantage and influence of the more general circulation of this magazine.

Our object in this new departure is to give to the centers of medical learning in America a medium through which to publish valuable material, the knowledge of which is often lost to the scientific world through lack of organization — a medium which, by its literary cooperation, shall stimulate the activities of our surgical clinics and anatomical laboratories in much the same manner that *von Bruns's Beiträge* has stimulated and enthused the clinics of Europe.

By way of illustration, a partial list of the committees, one from each large city, showing their *personnel* and the method of their organization, is here given:

CHICAGO UNIVERSITY (RUSH):
Surgery: Murphy, Bevan.
Gynecology: Webster, Lynch.
Obstetrics: Paddock, Holmes.
Editorial Secretary: Dean Lewis, M. D.

JEFFERSON MEDICAL COLLEGE:
Surgery: Keen, Da Costa.
Gynecology: Montgomery, Fischer.
Obstetrics: Davis, Coles.
Editorial Secretary: E. P. Davis, M. D.

HARVARD UNIVERSITY:
Surgery: Burrell, Nichols, Greenough.
Gynecology: Green, Young.
Obstetrics: Newell, Swain.
Editorial Secretary: David Cheever, M. D.

PHYSICIANS AND SURGEONS (New York):
Surgery: Blake, Brewer.
Gynecology: Cragin, Matthews.
Obstetrics: Painter.
Editorial Secretary: Walton Martin, M. D.

JOHNS HOPKINS UNIVERSITY:
Surgery: Bloodgood, Cushing.
Gynecology: Kelly, Cullen.
Obstetrics: Williams, Slemons.
Editorial Secretary: Joseph C. Bloodgood, M. D.

II

The second innovation we have to announce is the establishment of a DEPARTMENT OF TECHNIQUE.

Ordinarily, communications from the masters of surgery contain everything of value, except a true picture of the exact details of their operative procedures. Technique is supposed to be gleaned from text-books or from witnessing operative clinics. Unfortunately, many of our most successful operators are not text-book writers, and text-book writers are unable to keep pace with the advances in technique as exemplified in our best operators. Hence text-books are inadequate.

It is also impossible for surgeons and practitioners to attend the clinics of the great operators continuously, and they are unable, therefore, to observe and keep in touch with advances in surgical technique. Then, too, many of our best technicians do not give public operative clinics. Hence our old methods are inadequate. It is left only for the few favored ones, those who can arrange to become assistants to great operators, or those who can spend much time and money in visiting many clinics to remain conversant with the technical progress of surgery.

To remedy this weak point in the dissemination of adequate technical knowledge in

surgery, we have established our Department of Technique.

Each month, several of the masters in surgery, gynecology, and obstetrics will be requested to give in print and illustrations exact pictures of their latest accepted technique, with minute detail, of ordinary operative procedures. Included in this will be the operating-room, delivery-room, and home technique, as carried out by the operator and his assistants and nurses in operations, gynecological treatments, and the conduct of normal and operative obstetrics.

This department will be so systematized that in the course of a year a complete volume of exact technical knowledge, originating with the best men in the world, and stripped of all extraneous matter, will be in the possession of the readers of the journal.

FRANKLIN H. MARTIN, M. D.

THE NICHOLAS SENN CLUB

On the evening of December 18th occurred the first annual dinner of the Nicholas Senn Club, at De Jonghe's. The occasion was auspicious, and a most enjoyable one to those present. Other professions have united in honoring their distinguished members in this way, but, as far as we know, it is the first time that medical men have banded together in a club with the avowed object of doing honor to a single man.

The principal object of the club is to publish a "Festschrift" in honor of Dr. Senn, but already many other plans have been proposed by which the club may advance the cause of scientific research and also promote good-fellowship among those interested in a common cause. Under the skillful guidance of the president, Dr. Fernand Henrotin, the Nicholas Senn Club with a single bound has taken its place among the leading clubs of the city. The idea of the club, as well as the publication of the "Festschrift," was a happy one. Dr. Senn's position in our local profession is a unique one, and it requires the magic of his name to carry such a movement to success. The emblem adopted by the club—a crossed pen and scalpel, with the words, inscribed beneath, *Nil sine labore*—is a most fitting one, and accurately represents the life-work of this distinguished surgeon and writer and the principle on which it has been founded.

It is not the intention of the founders of the club to confine the membership to Chicago, and already there is a list of non-resident members. If the enthusiasm and good feeling shown at the dinner augurs anything for the future, the Nicholas Senn Club will henceforth be a power in the professional interests of our city.

CÆSAREAN SECTION VERSUS PERFORATION

The reduction of the mortality in diphtheria from 55 to 6 per cent or less, by means of the antitoxine, has been justly heralded as one of the greatest and most dramatic triumphs of modern medicine.

The profession, meanwhile, has not overlooked the fact that during the last forty years the development of a technique, the observance of rigid asepsis, and insistence upon a suitable environment, have lowered the mortality of Cæsarean section for "relative indications" from 50 and 85 per cent to 10 per cent, and even, in a large series of cases, to zero.

Following, naturally, this remarkable change in the fatalities, the indications for the operation have been greatly extended, and now include many conditions, in connection with which the thought of this operation did not previously occur.

This reversal of feeling has made Cæsarean

section a very popular operation, and it has attained a vogue that threatens, unless checked, to become a serious menace to the people, and in time to react upon the profession.

It has seemed necessary, therefore, to raise a voice in warning against the too frequent performance of this operation, owing to the hopes inspired by the hospital mortality statistics.

Let us emphasize, by repetition in some detail, those factors and conditions which have made possible the wonderful diminution in the mortality which now exists for mother and child.

It will be conceded, doubtless, that a *sine qua non* is the practice of rigid asepsis and antisepsis, not only in reference to operator and patient, but in the persons of his assistants and in the dressings, sutures, instruments, and environment.

This necessary aseptic environment can only be found in approximate perfection in the clinics and hospitals of the cities, and is only occasionally and very imperfectly reproduced when an experienced operator transfers his own paraphernalia and accessories to the home of the patient.

The operator must, of necessity, be clean and skillful; his assistants during the operation, and the nurse who takes the after-care of the case, should be experienced in abdominal work and responsible in emergencies; for the operation is one in which unexpected events that threaten the life of the patient may at any instant occur and demand all the resources of the entire staff.

It is evident that the popularity of the operation, mistakenly based on the low mortality obtained under the most favorable circumstances, together with its assumed simplicity of execution, will tempt to its performance many men who have not acquired the proper technique and experience, who have not at hand the essential aseptic environment nor the competent assistants, and, in consequence, the mortality statistics will again rise and many lives be unnecessarily sacrificed.

The requirements for success in the operation are all important, and none can be voluntarily omitted.

Yet some or all may be, and probably are, grossly and inexcusably evaded by city practitioners, either from an absence of professional conscience or from a desire to perfect their technique; but with these cases founded in the moral nature of the individual, and happily few in number, it is useless to concern ourselves. We make our plea more especially to the practitioner who may be misguided, possibly, by the statistics, and who errs only in the honest and earnest desire to give his patient what appears to be the most satisfactory treatment.

The correction of this impression will naturally bear hardest on practitioners outside the cities, where the requirements for the operation are absolutely impossible of attainment. The country practitioner, furthermore, meets with additional obstacles in his cases, which render success by this operation highly improbable, if not impossible.

Thus he may reach the patient long after the rupture of the membranes, or she may be one who has been repeatedly examined and therefore infected, or he may, and usually does, arrive at such an unfavorable stage of the labor that an emergency operation must be done, if any — an operation which is in the highest degree dangerous even when conducted with all the advantages of a well-equipped hospital.

Under such conditions, even in an exceptional hospital environment, it is not unusual to refuse Cæsarean section and choose an operation less dangerous to the mother.

Must, then, the operation be entirely abandoned in country practice?

We can only say that when the operation is undertaken for " relative indications " only, it is intended to increase and not to diminish the patient's chances of life, and if it cannot be done with the aid and assistance of all the factors and conditions that are essential to its success, *it must not be done at all.*

This statement, although well justified, may seem too sweeping and destructive to many, and the question very naturally arises as to the procedure necessary and proper to be undertaken in its place by the physician who is face to face with conditions which demand immediate action.

Fortunately, something can be suggested which at once corresponds with the progressive scientific spirit of the day, which does not offend the intelligence of the community, and, in addition, means almost certain safety for the mother. I refer to *perforation.*

Statistics carefully compiled from country practice by Dolder show a maternal mortality in this operation varying from 6.5 to 11 per cent, as compared with a mortality (in the country) from Cæsarean section, under best conditions, of 50 per cent.

It is certain that in well-judged cases, where expectancy has not been carried to the extreme, and with careful attention to other necessary details of the operation, notably asepsis, this mortality can and should be greatly reduced.

It is not impossible that the mortality in this operation should compare very favorably with the same operation in the best hospitals, and approximate zero, which is the ideal condition of maternal safety.

Some comparisons of the two operations will show the differences more clearly.

Perforation is practically a bloodless operation, in which the mutilated child is usually drawn quite readily through the natural passages, while in Cæsarean section the large abdominal and uterine wounds easily furnish the opportunity for a minimal quantity of septic material to become extremely dangerous.

Any physician is in a position to satisfy in full measure and in the poorest surroundings all the demands of antisepsis which perforation requires, while for Cæsarean section the conditions are practically insuperable outside the hospital.

The technique of perforation is taught on the manikin in the same way, and can be made as perfect as the use of forceps, while the technique of Cæsarean section is much more complicated, and should be practised repeatedly on the living subject under competent teachers before undertaken with individual responsibility.

The doctor can perforate and extract without assistants, while at least three are necessary in the Cæsarean operation.

After the delivery of the mutilated child the mother needs only the ordinary care of a lying-in woman, while the absence of a competent nurse for the sectioned patient may cause her death.

Furthermore, the woman is not predestined to have all successive pregnancies terminated in this way.

In a second pregnancy, premature labor may be induced under some conditions, and in about two thirds of the cases with success, the prognosis being greatly improved if an incubator can be secured. When a subsequent confinement approaches, it might also be possible or desirable to send her to a hospital for such attention and accessories as her case demands.

In the consideration of this subject we have had in mind the welfare of the mother as the principal, if not the sole, aim of treatment, and we face conscientiously the sacrifice, even, of the living child, in obedience to the maxim so strongly impressed upon the medical world

by Simpson, that the *safety of the mother is the supreme law.*

The mother is already a unit of great economic value to the state, while, from different causes, not more than two thirds of the babes born living survive their fourth year. Hence, from a civil standpoint, the child has a much smaller claim to life than the mother, unless the latter is hopelessly diseased.

The conditions, therefore, under which alone the certain safety of mother and child can be hoped for must be kept ever in sight, and if we compare these essentials with the best obtainable conditions in the country practice, we will see wholly justified the dictum of Wydar, von Winckel et al., that if Cæsarean section becomes much more common outside the well-conducted hospital, the old mortality (50+ per cent) will again be reached.

With the mortality statistics of the two operations kept in mind, the practitioner must also remember that he doubles his responsibility when, for "relative indications" only, he adds the death of the mother to that of the child.

The modern operation of perforation even of the living child should and will forever play an important part in country practice, but the modern operation of Cæsarean section is and must remain especially the operation of the city practice, the clinic, and the hospital.

CHARLES B. REED, M. D.

DEPARTMENT OF TECHNIQUE

THE TECHNIQUE OF THE SURGICAL DEPARTMENT OF COOK COUNTY HOSPITAL

By C. P. PHEMISTER, M.D.
Interne Cook County Hospital

On account of the size of the institution, the large amount of work being done, which has amounted during the past year to 2,400 operations, and the large number of surgeons composing the hospital staff, it is very difficult to adopt a routine technique which will be followed by every one. Yet, despite the individual variations and demands of the different men, there is a decided uniformity in the way that the work is carried out.

There is a definite routine in the method of preparation, handling, and sterilization of the surgical supplies, all of which is carried out by the nurses. The only differences of importance are in the method of preparation of the patient and operators for operation, and differences in operative technique.

An account will now be given of the operating department, and of the technique of the work in connection with it.

The operating department occupies the entire top floor of the Receiving Building, which is divided into fourteen rooms, as follows: Four operating-rooms, two anæsthetizing-rooms, two waiting-wards, a linen-room, supply-room, instrument-room, sterilizing-room, nurse-room, and lavatory.

The operating-rooms are 18 feet long by 12 feet wide, and are amply provided with both sky and window light. They contain the following furnishings and supplies during the course of an operation:

1. An operating-table.

2. An instrument-table, which has two shelves. The top shelf is for the instruments used in the operation, while the lower shelf contains the cans in which all of the varieties of suture material are kept.

3. One large supply-table, with two shelves. The upper shelf contains the following articles: Glass jars, in which the following sterile supplies are kept: rubber tubing, rubber strips, plain and iodoform gauze strips, one-ounce bottles and medicine-glasses, irrigating-points, syringes, hand-brushes, catheters, applicators, and small pledgets of cotton. The upper shelf also contains a bottle of collodion, sterile vaseline, iodine, glycerine, all of the ordinary hypodermic solutions, and antiseptic dusting-powders. The lower shelf contains the coarse supplies, such as bandages, binders, adhesive plaster, pins, constrictors, and rolls of surgical cotton.

4. One small supply-table, with two shelves. The upper shelf contains solution-bottles of 50-per-cent alcohol, 1 to 500 bichloride of mercury, and 5-per-cent carbolic acid, tincture of green soap, sterile safety-pins, sterile vaseline, a basin of soap and water, a sterile dressing-forceps for handling the sterile supplies, one can of sponges, one can of dressings, and a copper box containing either a laparotomy, a plain, or a gynecological set, as the case demands. The lower shelf contains a pitcher of hot and one of cold sterile water, and the extra sterile supplies.

5. An irrigating-rack and irrigator.

6. Three basin-racks. One rack holds four basins, which contain the solutions for disinfection of the hands. The usual arrangement is, from left to right, sterile water, 5-per-cent carbolic acid, 1-1000 bichloride, and sterile water. A second rack, holding two basins, is for 95-per-cent alcohol, and sterile water containing the gloves. A third rack, holding two basins, which are used for laparotomy-pads and the irrigation-coil.

7. A solution-rack, which contains six one-gallon bottles. Two are for 1-500 bichloride, one for 15-per-cent carbolic acid, one for boric acid, one of alcohol, and one of 2-per-cent lysol.

8. Three pails for soiled supplies.

9. Two stools.

10. Kelly pad.

11. Tank of hot and cold sterile water.

The Sterile Supplies.— These consist of sponges, dressings, large and small sized cotton pads, which are surrounded by one thickness of gauze, rolls of gauze two yards long and six inches wide, laparotomy sponges done up in set of six, towels, plain sheets, laparotomy sheets, gynecological sheets, and gowns. These are sterilized, both in separate pieces wrapped in muslin, and after being

grouped into sets and placed into telescoped copper boxes. There are three kinds of sets: laparotomy sets, plain sets, and gynecological sets. A laparotomy set consists of one laparotomy sheet, one plain sheet, one set of laparotomy sponges, ten towels, and two pads. A plain set contains the same, with the exception of a second plain sheet instead of the laparotomy sheet, and a gynecological set contains instead of the laparotomy sheet a gynecological sheet. The supplies are sterilized in the steam-sterilizer with fifteen pounds of pressure for thirty minutes. After this they are dried for one hour in a vacuum. Pitchers and basins are placed in pillow-cases and sterilized in the same manner. Instruments and gloves are boiled for ten minutes. Knives and scissors are carbolized in 95-per-cent carbolic acid.

The suture material used here consists of numbers 0, 1, 3, and 5 catgut, silkworm gut, horsehair, kangaroo tendon, silver wire, aluminum-bronze wire, and fine, medium, and coarse silk.

There are three methods of preparation of the catgut in use: the chromicized, iodized, and pyoctanin.

The chromicized is the form most extensively used, and is prepared as follows: After soaking in ether for fourteen days, during which time the ether is changed once, it is wound on glass spools and placed in a 1-3000 chromic-acid solution, where it remains for twenty-four hours. It is then dried in the sunlight for three days, after which it is placed in jars of 95-per-cent alcohol and boiled for thirty minutes; twenty-four hours later it is again boiled, when it is ready for use.

In preparing the iodized form the catgut is cut into eighteen-inch pieces and coiled. It is then placed in a .50-per-cent iodine in a one-per-cent iodide-of-potassium solution, where it remains eight days, after which it is preserved in 95-per-cent alcohol ready for use.

Silk is prepared both for ligatures and for sutures. Ligatures are cut fifteen inches long and wound on glass slides, three ligatures being placed on each slide. Sutures are threaded on straight intestinal needles and supported by stitching them loosely through narrow strips of gauze. The glass slides and folded strips of gauze containing the threaded silk are placed in double envelopes and sterilized by steam.

The preparation of the patient for operation is as follows: The night before, the patient is given a cathartic, the field of operation scrubbed and shaved, and a green-soap dressing applied. Some operators, after scrubbing and shaving the field, disinfect it with alcohol and bichloride and apply a weak antiseptic dressing, while others only shave their patients, without the application of either antiseptics or dressings until the patient is placed upon the operating-table. Results are about the same for all of the different methods. No diet is allowed at the meal-time previous to operation, and a colonic flushing is given four hours before. The majority of cases receive a quarter-grain of morphine hypodermically, just before going to the anæsthetizing-room.

For anæsthesia, ether is used very largely, and is administered both by the cone and drop methods. Chloroform is used to a much less extent. The anæsthetic is frequently started with nitrous oxide gas and continued by ether. Nitrous oxide as a continuous anæsthetic for the shorter operations, such as rib-resection, appendectomy in the interval, and herniotomy, is used considerably.

The patient, after being anæsthetized, is removed to the operating-room and placed upon the table, where the preparation is completed. After scrubbing with soap and water, the field is disinfected with alcohol and bichloride, and covered temporarily by a dressing saturated with bichloride. Towels are then placed about the field of operation and a laparotomy sheet spread over this. In all cases where the patient is put in the lithotomy position a gynecological sheet is used. One end of the sheet is split up the central portion, forming two wings, which are wrapped about either limb of the patient, leaving a convenient exposure of the field of operation.

The operating surgeons, after scrubbing with green soap and water, first wash in sterile water, then alcohol, then carbolic acid, then 1-1000 bichloride, and again in sterile water, after which the gloves are put on. Gloves are worn for all cases by almost the entire staff. The gowns worn during the operation contain short sleeves, which reach to just below the elbows.

There is some uniformity in the number and kind of instruments used by the different men for the same operation, and for convenience in ordering, the following sets have been arranged:

1. A laparotomy set, which consists of 2 knives, 2 pair of scissors, 9 hemostats, 2 eighth-inch forceps, 2 pair of toothed and 2 pair of untoothed tissue-forceps, 1 pair of sharp and 1 of blunt superficial retractors, 1 of narrow and 1 of broad, deep retractors, 2 vulcella, 2 pedicle needles, 2 tenacula, a needle-holder and needles, a grooved director, and Kocher and Fenger dissectors.

2. A herniotomy set, which consists of 2 knives, 2 pair of scissors, 9 artery-forceps, 1 pair of sharp and 1 of blunt superficial retractors, a grooved director, Kocher and Fenger dissectors, 2 pair of toothed and 2 of untoothed tissue-forceps, a needle-holder and needles.

3. Amputation set, which consists of 2 knives, 2 pair of scissors, 9 hemostats, 2 eighth-inch hemostats, 2 pair of toothed and untoothed tissue-forceps, 2 sharp and 2 dull superficial retractors, bone-cutting forceps, bone-holding forceps, periostial elevator, needles, needle-holder, and 2 saws.

4. Curettement set, which consists of 2 Sims's specula, 2 vulcella, 2 tenacula, Hagar's and Goodell's dilators, 2 dull and 2 sharp curettes, a uterine sound, and uterine douche point.

Instruments for other operations are ordered separately, and there is a wide variation in the number used. Some men will operate with half the number of instruments that others will use.

In operative methods and technique there are found the greatest variations which exist in connection with the surgical department. The kind of suture material used for suturing the same structure varies a great deal, according to the individual men. For ligating vessels, catgut is used almost exclusively. For intestinal sutures, silk is used very largely, and it is only where inflammatory conditions are marked, as in dealing with advanced cases of appendicitis, that catgut is given the preference.

Silver and aluminum-bronze wire, and occasionally No. 5 catgut, are used for bone sutures. For fascia and muscles, as in closing the abdomen after laparotomy, catgut is used almost entirely. A continuous glover's or locked stitch is given preference over the interrupted, unless the sutures are put on great tension, or inflammation exists.

In closing the skin, all types of stitches and kinds of suture material are in use. Perhaps the commonest way is to close the skin incision with interrupted silkworm gut. Then the continuous silkworm gut, figure-8 silkworm gut, continuous horsehair, which is sometimes combined with interrupted silkworm gut, and a subcutaneous silkworm gut, are all in use.

M. L. Harris uses a subcutaneous silver wire for closing not only the skin, but also the other layers of the wound, in all of his laparotomies and herniotomies. Andrews, Schroeder, and Besley are using a very fine catgut for skin suture (No. 0 or 00), largely for the reason that it is absorbable, and there are no stitches to be removed.

With the exception of the Murphy button, there are few of the mechanical devices in surgery that are employed here. The button is extensively used in the large number of strangulated hernias and intestinal obstructions demanding the resection of intestine, where time is an important factor in the result. The McGraw ligature for gastroenterostomy has been used to a limited extent.

M. L. Harris is using a new device to prevent the formation or recurrence of adhesions in the abdominal cavity in the form of very fine silver foil, which is pasted over the involved portion of intestine. No subsequent laparotomies nor postmortems have been made on any of the cases to observe its effects.

To illustrate the number of different operations employed for the same procedure, there is no better example than the operations for inguinal hernia.

The Bassini operation is one often employed, using either a continuous or interrupted catgut for the sutures passed beneath the cord, and a fine continuous catgut for the external oblique.

The Andrews operation is performed by the inventor and others, as originally described and with various modifications. The internal oblique and external oblique are sutured to Poupart's ligament, beneath the cord, by either a continuous suture, an interrupted suture, or figure-8 sutures. The latter sutures enter through the lateral margin of Poupart's ligament, pass inward through the internal oblique, then outward and pick up a few fibers of the inner border of Poupart's, then inward again, and after picking up the external oblique, pass outward through Poupart's ligament, where it is tied, the knot being on the anterior and lateral surface of the ligament. Drs. Andrews and Schroeder use the deep mattress stitch. Harris performs the Andrews operation by using a continuous silver wire for all of the layers, each end of the wire sticking out through the skin at the extremities of the wound. After healing takes place, these wires are withdrawn.

Davidson performs the Bassini operation in the same way that Harris does the Andrews, using a blue, a red, and a white strand of silkworm gut for the three layers, instead of the silver wire. They are withdrawn, after the wound has healed, in the same way as the wire sutures.

The idea in the use of non-absorbable, non-hygroscopic suture material which can be withdrawn is, that it lessens the danger of infection.

OBSTETRICAL TECHNIQUE IN THE COOK COUNTY HOSPITAL

By HENRY F. LEWIS, M. D.

Attending Obstetrician Cook County Hospital; Professor and Head Department of Obstetrics in the American College of Medicine and Surgery

The following, in brief, is an outline of the management and treatment of obstetrical cases in the Cook County Hospital.

The personnel of the staff consists of six attending obstetricians, who are on duty in charge of all the obstetrical patients in the hospital for terms of seven weeks each; four internes (two regular and lwo sectarian), who are in what is called the middte service, that is, the second six months of their eighteen months' course. The regular internes serve six weeks and divide about three fourths of the cases; the sectarian internes serve three months. The attending obstetrician must visit the wards at least three times a week and sign each history-sheet. He is summoned for all operations except low forceps and immediate perinæorrhaphies

Patients may be admitted one month before expected confinement. An average of a little over one delivery a day has been kept up for the past ten years, not increasing perceptibly from year to year. On admission, the woman is given a full bath and is provided with clean clothing from the hospital store. Her own clothes are fumigated and held in the custodian's office until her discharge. Each woman, unless already in labor, is soon examined carefully and systematically by the interne in charge. A complete history is entered on blanks provided, and a complete physical examination is made. This examination includes the heart, lungs, and general bodily condition. The results of the pelvic measurements and abdominal and vaginal examinations are recorded. The urine for twenty-four hours is measured and examined for specific gravity, reaction, albumin, sugar, and sediment.

The woman is allowed the freedom of the waiting-ward, and may be employed in light duties in the main obstetrical ward. Diet, catharsis, and diuresis are prescribed according to indications. Her work consists of sweeping, cooking, sewing, scrubbing, and, under the supervision of the nurses, in assisting in the care of the babies. The obstetrical ward is in an isolated pavilion. The lower story is occupied by waiting women. The upper story, which can be entered only by a stairway from the lower story, consists of a wide central corridor on either side, and at the distal end of which are large and small rooms. These rooms are: the bathroom, nursery, nurses' room, delivery-rooms, and rooms containing beds for patients. No one is allowed in the obstetrical ward, except the patients, nurses, and doctors. No visitors are permitted to see the patients. No clinical advantage is permitted to be taken of this rich material. The only educational value of it all is to the internes, the attending obstetricians, and the nurses of the ward. Not even small classes for the practice of external palpation are allowed.

When labor pains begin, the patient is isolated in one of the rooms of the obstetrical ward, given a bath and an enema. Further preparations include shaving the genitals and scrubbing with green soap an area included between the pubes and the breasts, as well as the perineum, buttocks, and inner surface of the thighs. The excess of soap is removed with sterile water and bichloride of mercury solution (1-1000). A pad moistened with the solution is allowed to remain over the vulvar outlet. The prepared parts are then wrapped in sterile sheets. If the bladder has not surely been emptied within a short time, and cannot be spontaneously, it is catheterized by means of a sterile rubber instrument. This is repeated in prolonged labors, unless there is certainty that the bladder has emptied itself. Such preparations as above are administered to primiparæ at the end of the first stage, and in multiparæ according to the frequency and intensity of the pains.

At the time of entrance, or soon afterwards, external palpation has been practised. At the labor this is repeated, and the diagnosis of position attempted by this means. It is usual to make one vaginal examination at the onset of labor, and others rarely in the course of labor, if there is any doubt as to position or progress. The hands are scrubbed with green soap, rinsed in sterile water and alcohol, and then in one-per-cent lysol solution. This solution is kept in a sterile basin for rinsing the hands during the labor and for washing off the external genitals of the patient when necessary. Sterile rubber gloves are always used. The woman is usually delivered in the semiprone posture, with the buttocks at the edge of the bed. The bed is a high iron hospital-couch with woven wire spring and thin hair mattress.

If operative interference is indicated, the patient is placed upon an operating-table and anæsthetized. If the placenta is not spontaneously expelled within thirty minutes, Credé's method of

expression is employed. Manual extraction of the placenta is forbidden without the presence of the attending obstetrician, except for serious hemorrhage. If there is no hemorrhage and the placenta cannot be expelled by Credé's method, an aseptic dressing is applied over the vulva and the woman put to bed until the attending obstetrician arrives. Meanwhile careful watch is kept to detect hemorrhage. After delivery the placenta is carefully examined for anomalies and pathological appearances, is measured and weighed, and the results are recorded. The cord is tied after pulsation has nearly ceased, by means of a narrow sterile tape. A temporary aseptic dressing is applied.

Lacerations of the vulvar orifice and pelvic floor are repaired at once with silkworm-gut interrupted sutures. The ends are left long to facilitate removal. The external parts are sponged with gauze soaked in lysol solution, irrigated with sterile water, and covered with a sterile gauze and cotton pad held on by a T-bandage. In suitable cases fluid extract of ergot, M. xx, with fluid extract of hydrastis, M. xv, is given every four hours for several doses.

As soon as possible after birth, the infant's eyes are treated with two-per-cent solution of silver nitrate followed by normal salt solution. Sometimes five-per-cent argyrol solution is used in place of the silver nitrate. The baby is anointed plentifully with sterile olive oil and the vernix removed as far as possible by gentle friction. The cord is dressed with sterile gauze moistened with fifty per cent alcohol. This cord-dressing is renewed each day until the stump drops away. On the second day the child is bathed by sponging and then oiled again. When the stump falls off and it is seen that there is no inflammation about the navel, the child is given a daily tub-bath followed by anointing. A snug abdominal binder is worn until the navel is completely healed. All clothing is sewed on the infant. The baby is put to the breast 4-6 hours after labor and every four hours until milk comes; after that, every two hours during daytime and four hours during night-time.

Boric acid solution is applied to the breasts before and after each nursing. Engorgement is treated by massage, rest and binder. For fissures, cleanliness is maintained and the crack is treated with tincture benzoin compound every four hours.

In the after-treatment of the mother the vulvar pad is changed every four hours and the parts cleaned with a 1-200 lysol solution followed by a sterile external irrigation. Temperature, pulse and respiration of mother and child are recorded every four hours for the first three days, afterwards A. M. and P. M.

Liquid diet is administered for the first twenty-four hours. Next the woman is allowed toast, milk, egg, custard, etc. Meat and ordinary ward diet is not given until the seventh day. After each bowel movement an external irrigation with sterile water is done. The bowels are moved, unless they move spontaneously, on the second day by enemata or a mild cathartic, preferably castor-oil.

The patient receives a daily sponge-bath. The height of the fundus is noted daily, as well as the appearance and estimated amount of the lochia. When, in normal cases, the uterus is no longer palpable above the pubes, the woman is allowed to leave the bed. After the second week the patients are allowed to return home if they so desire.

I am indebted to Dr. Homer I. Davis, obstetrical interne, for valuable assistance in preparing this report.

THE TECHNIQUE OF THE LONGITUDINAL WIRE SUTURE IN THE CLOSURE OF THE ABDOMEN AND IN THE RADICAL OPERATION FOR HERNIA

By M. L. HARRIS, M.D.

Ex-Interne and Attending Surgeon, Cook County Hospital, Alexian Brothers Hospital, Children's Hospital, Passavant Hospital, Policlinic Hospital

The wire used is aluminum bronze Nos. 26 and 27 for ordinary purposes. The advantages of this wire over silver are its much greater tensile strength, consequently a smaller wire can be used, and the fact that it does not kink so readily. The wire can be easily, quickly, and certainly sterilized by simply placing it in boiling water with the instruments.

In closing a median incision through the abdominal wall, three wire sutures are used, one closing the peritoneum, one in the sheath of the rectus muscle, and one in the skin.

The sutures are introduced in the following manner: A No. 27 aluminum-bronze wire is threaded directly in a nearly full curved round needle with a specially constructed eye for carrying wire so it

will not slip in the eye. The needle is made to enter the skin in the midline, one to three centimeters from the angle of the incision, and penetrates obliquely all the tissues down to the peritoneum, where it should appear at the angle of the peritoneal incision.

The peritoneum is now taken up with the needle, parallel with and quite near to its edge, first on one side and then on the other, constantly in an advancing manner until the entire length of the incision has been traversed. The grasp of the needle should not be more than a centimeter in length, and the point of entrance of one grasp should be opposite the point of exit of the last grasp. The suture is then brought obliquely to the surface about the same distance from the cutaneous angle as at its point of entrance. The second suture, wire No. 26, enters in the midline, but a little nearer the angle of the incision. It penetrates as far as the sheath of the rectus muscle, where the edges of this fascia are taken up longitudinally in exactly the same manner as has just been described for the peritoneum.

No sutures are applied to the recti muscles. At no point in the midline do the recti muscles lie in contact with one another; hence in closing a median incision it is unnecessary to suture together the recti muscles with the expectation of obtaining union between them. The dense, thick, conjoined fascia of the linea alba in the upper part of the abdomen or the firm anterior layer of the muscle sheath below Douglas's fold is the all-important layer to be sutured. This is the layer in which the most perfect apposition, edge to edge, should be secured.

The third suture is the usual subcutaneous or subcuticular suture. The wire enters and leaves at the angles of the incision, running along in the corium, in and out, in the same manner as has been described for the other two. It does not appear on the skin at any point, except where it enters and leaves. After the wires are introduced, they are drawn back and forth until they are perfectly straight and move easily through the tissues. The wound may now be dressed in any manner one chooses. The method I use, and think the neatest and best, is to seal the line of union with silver foil after Halstead. Place on this a compress of a few layers of plain sterile gauze, over which are folded the ends of the wires, which should be left long. On these is placed another similar compress, followed by the usual dressing of plain sterile gauze and cotton.

The wires are usually allowed to remain two weeks. To remove the wires, they should be drawn back and forth gently until loosened in the tissue, then one at a time cut close to the skin and withdrawn. They are easily removed, with scarcely any pain. Care should be taken not to break the wires by pulling suddenly before loosening them.

While the suture has been described in connection with the closure of median celiotomy incisions, it finds many other valuable applications. In closing the muscle-splitting incision in interval operations for appendicitis, one wire parallels the fibers of the internal oblique and transversalis, entering and leaving the skin some distance from the cutaneous incision, and crossing it almost at right angles. Another wire parallels the fibers of the external oblique, and a third forms the subcuticular suture.

The method which I use in operating for inguinal hernia is described in detail as follows:

A straight incision is made through the skin and superficial fascia parallal with but from 2½ cm. to 3 cm. above Poupart's ligament, beginning just above the spine of the pubes and extending outward a little beyond the internal ring. This incision, varying slightly in length according to the amount of fat present, is sufficient for all herniæ, no matter how large the same may be. The aponeurosis of the external oblique is then incised, beginning at the upper and outer point of the external ring and extending outward parallel with its fibers to just beyond the internal ring. The sac and cord are freed and the sac separated from the cord well up to the internal ring. The sac should always be opened in order to see that it is perfectly empty. It is then transfixed at its neck and ligated with catgut, cut off, and the stump allowed to retract within the internal ring.

The needle enters the skin from one to two centimeters from the inner angle of the incision, passing directly down to and taking up a " bite " of the beginning of the inner edge of Poupart's ligament. A " bite " about one centimeter in length is then taken directly opposite, including the external oblique and the internal oblique and transversalis, or so-called conjoined tendon. Then a " bite " in Poupart's ligament, passing back and forth until an opening only large enough to permit the passage of the cord remains at the outer angle. Passing the wire beneath the cord, it is brought out through the external oblique and skin about one to two centimeters from the outer angle of the incision.

The wire should be pulled back and forth until it is perfectly straight and moves easily in the tissues. This wire is very easily introduced by paying a little attention to a few points. Place a snap forceps on the free end of the wire to keep it taut.

Draw each stitch taut at once. Enter at a point directly opposite the point of exit of the last stitch. Take each " bite " parallel with the edges to be brought together. Do not make an over-and-over stitch, as it will not pull out. Do not allow the wire to kink.

After the wire is in, the cord is laid along its bed and the lower flap of the aponeurosis of the external oblique covered over it and sutured by a wire introduced in the same manner as the first, but passing from the outer to the inner angle of the incision, leaving an opening at the external abdominal ring just large enough to give exit to the cord. The cutaneous edges are now brought together by a third wire on a cutting-needle passed in the corium, a so-called subcuticular suture. The incision is sealed with silver foil, a pad of several thicknesses of gauze placed on the first one, and the whole held in place by a couple of strips of adhesive plaster. The wires are removed at the end of two weeks.

TECHNIQUE OF REMOVAL OF THE BREAST AND AXILLARY GLANDS

By JOHN B. MURPHY, A.M., M.D., LL.D.

Professor of Surgery Rush Medical College; Interne Cook County Hospital, 1880

As an extensive article was recently published by me on this subject in the New York *Medical Journal*, the reader is referred to it for details. To-day I shall deal principally with the technique of the excision of the mammary gland. Many operators have met with unpleasant sequences after the removal of the breast for carcinoma.

The most frequent are the following:

(*a*) Limitation of motion.

(*b*) Venous or lymphatic stasis.

(*c*) Neuroses.

Limitation of motion is the result of (*a*) faulty line of cutaneous incision, and (*b*) malposition of the arm immediately after the operation. Surgeons who make the mid-axillary incision and adduct the arm on the chest-wall have undoubtedly observed this result.

Venous and lymphatic stasis are due to pressure of cicatricial tissue upon the axillary vein (the lymphatic stasis is also partly due to the removal of lymph channels and glands) and lymphatic channels of the axillary space. The anterior or mid-axillary line of incision will frequently produce a scar, which, in contracting, will draw the arm too close to the chest-wall and consequently limit motion, especially if the arm be put in adduction immediately after the operation and the axillary skin is allowed to fall a long distance from the apex of the axillary triangle. The most desirable incision is the rectangular one made high up on the chest; the apex of the angle being immediately beneath the acromion process; the inner line being parallel to the long axis of the pectoral, directed toward the third costal cartilage, and the outer one parallel to the long axis of the humerus. By this incision both pectoral muscles are easily accessible, and for the dissections of the axillary space it affords the greatest latitude. The Rodman sinous incision fulfills the requirements admirably.

By these two incisions there are no chances of scar formation, which might eventually restrict motion or compress the axillary structures. The integument covering the breast should be conserved as much as possible, as I feel that surgeons remove more skin than is probably necessary. In the adenocarcinoma variety the skin is not involved, at least in the beginning, and there is no indication for its extensive removal. If we are convinced, however, that the skin is infiltrated by epithelial tissue — anatomical possibility due to the afferent lymph stream — it should be excised, and the denuded area covered by semicircular flaps of skin taken from the chest, back, or shoulders. In using these flaps we should not forget that the most desirable line of cutaneous union is above the anterior axillary margin. These precautions will always prevent contraction of the scar in the axilla, and consequent pressure upon the axillary structures and limitation of motion.

The next step in the technique of removal of the breast is the protection of nerve and vascular tissues by covering them with soft muscular tissue. Several muscles can be utilized for this purpose,— the pectoralis major, pectoralis minor, the latissimus dorsi, or even the subscapularis; in other words, any of the thoraco-humeral muscles. The muscle most advantageously used, however, is the lower half of the pectoralis major denuded of its aponeurosis. In the preparation of this flap the costal attachment of the pectoralis major is freed for a distance of from two to three inches. The

muscle is then split parallel to its fibers almost to the humeral attachment of the pectoralis. After the excavation of the axilla the flap is then swung upward and attached by three or four stitches to the apex of the axilla; the rest of the muscle, together with the pectoralis minor, may or may not be extirpated, according to the judgment of the surgeon. To secure a more perfect covering of the axillary structures, the muscular flap previously prepared may be fastened by two or three stitches to the latissimus dorsi. (See Fig. 3 B, B.) If the latissimus dorsi is utilized instead of the pectoralis major, the lowest portion of the muscle is attached and used in the same manner as the pectoralis major. This step finished, the skin is approximated, the arm dressed, and a plaster-of-Paris cast covering half of the chest and extending to the elbow is applied in such a manner that the arm is held at a right angle to the body. (Fig. 4). While such a position appears to be uncomfortable, I would say that my patients have never complained. The advantages of this cast

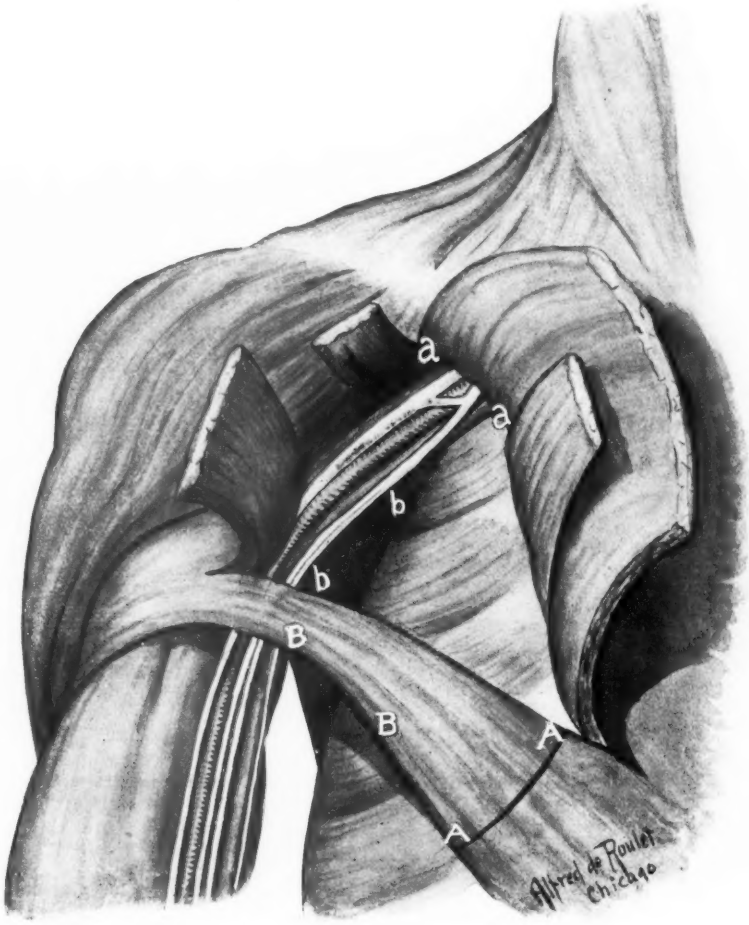


Fig. 1

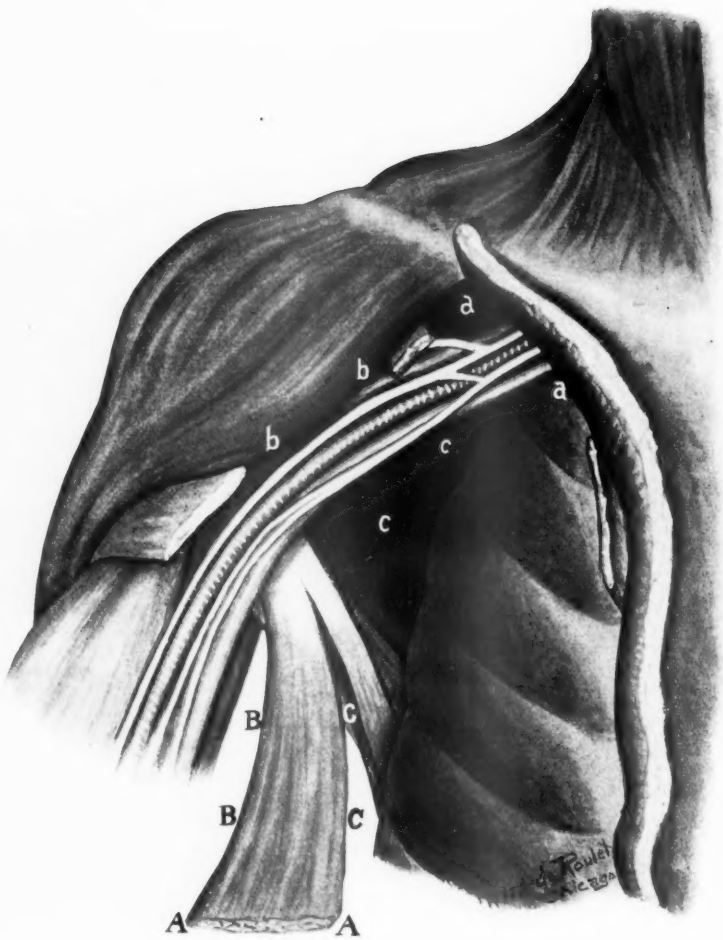


Fig. 2

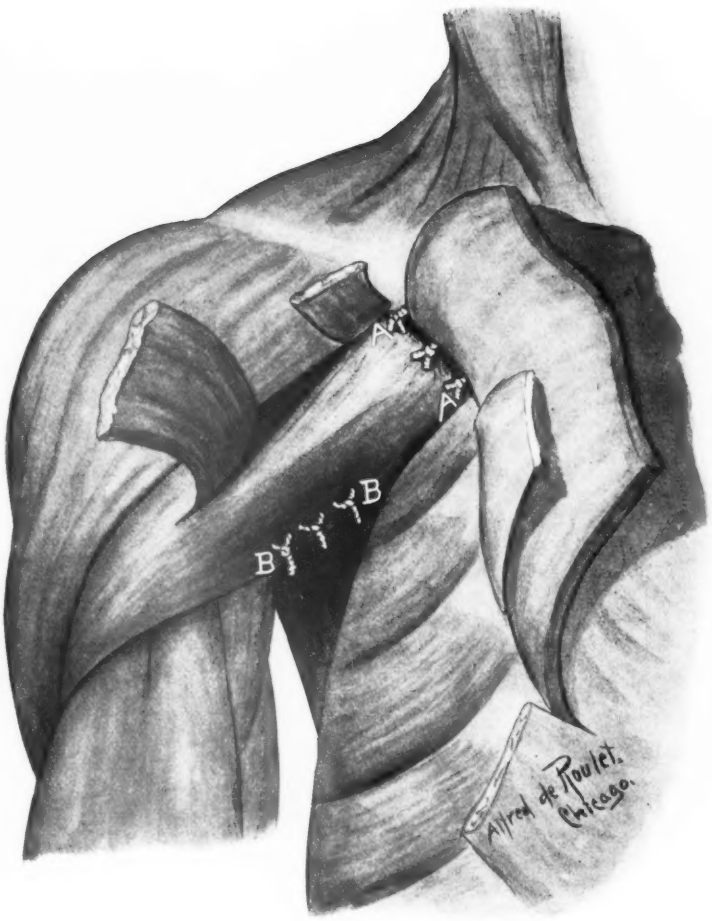


Fig. 3

Fig. 5

Fig. 4

Fig. 6

are: (*a*) Diminution of axillary triangle; (*b*) Immobilization of structures during process of repair. The cast is removed on the tenth day.

In conclusion, I will say that there are three necessary steps in the technique of the removal of the breast to obtain the most servicable arm.

1. Rectangular or sinous incision of the skin above the anterior axillary line.

2. Protection of the axillary structures (nerves, veins, artery, and lymphatics) by a muscular flap.

3. The application of a plaster-of-Paris cast in such a manner as to keep the arm at a right angle with the body during the healing.

Objection will be raised to using the pectoralis muscle on account of possibility of recurrence of carcinoma from the epithelial elements left in the muscle. Personally, I do not feel that such a fear has any foundation, as the lymphatics from the breast do not course through the muscle, but on its aponeurosis.

Thomas Bryant of London has not seen a recurrence of carcinoma within the pectoralis muscles in his surgical practice of forty years.

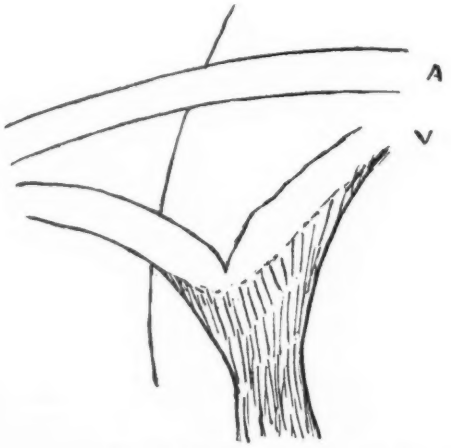


Fig. 7. Showing scar, with artery and vein

Photographs Figs. 5, 6, show the ability of the patient to lift the arm above the shoulders after removal of the breast by my procedure. They were taken three months after the operation.

By observing this technique I feel confident that the post-operative evil results from removal of the breast will be greatly lessened.

TECHNIQUE OF THE ANDREWS OPERATION FOR HERNIA

By E. WYLLYS ANDREWS, M. D.

Professor of Surgery Northwestern University Medical School; Attending Surgeon Mercy, Michael Reese, and Cook County Hospitals

This herniotomy is done in fifteen or twenty minutes in simple cases by Drs. Harris, Schroeder, Eisendrath, or myself.

Two types of imbrication or overlapping — a posterior, behind the cord, and an anterior, in front of the cord — are described in the original publication of ten and a half years ago (Chicago *Medical Recorder*, July, 1895). One of these has since been printed as the "Girard operation," and one as the "Hopkins' operation," with the statement: "This is called the Andrews operation, but we devised it independently."

Posterior imbrication appeals to those who like the Bassini method; anterior imbrication, to those who object to "transplanting the cord." It leaves the cord behind the deep suture line. There is a tendency of late to do more anterior operations, in which Dr. Ferguson of this city has been the pio-

neer. Dr. Coley of New York informs us that he uses both types, but rather more often the old-fashioned posterior method.

The minor details described below may vary with different operators, but should never vary with the same operator. Speed and smoothness come from uniformity, followed for uniformity's sake. Each operation becomes a rehearsal for the next. After this prologue we begin:

STEP 1. *Skin incision.* Location 2 or 3 cm. above Poupart's ligament, parallel to its inner two thirds. Length 15 to 18 cm. in adults. Pinch up a fold of skin transverse to the groin with the left hand, the assistant holding the same fold 3 or 4 cm. distant. Raise this fold 7 to 10 cm. and cut its whole height by one stroke of a large keen scalpel. Continue holding the pinched-up margins, relaxing slightly until the epigastric and other vessels are seen and secured. Then drop the skin and pick up every smallest bleeding-point. Do not allow even droplets of blood to continue running. Expose the external ring and aponeurosis cleanly.

STEP 2. *Opening inguinal canal.* Do not insert a director and split the ring up from below, but split the external oblique aponeurosis the length of the canal by one straight cut from above between its fibers. Evert the lower segment and run the scalpel handle along its inner aspect, exposing freely the shelving inner edge of Poupart's ligament.

STEP 3. *Removing the sac.* Either lift up the cord mass on the finger, which requires some blunt dissection, or let it lie adherent, according as you wish to repair the ring behind or in front of the cord. In either case remove any lipomatous masses high up by tying off above the ring. Do not remove any veins or cremaster strings. Cut a buttonhole with a small, keen knife in the fascia propria of the cord until, at just the right depth, you see the pearly-white sac-wall. It is like a hydrocele dissection. Seize this wall with blunt forceps and strip it rapidly out by sponging away the cord elements with dry gauze. Now and then strong adhesions are met, requiring nicking or cutting. In congenital hernias do not take time to sew a process of sac around the cord. Follow well up into the abdomen, and a place will be found where the cord and sac diverge, so that the sac-neck can be ligated without inclosing the vas or vessels.

In scrotal hernias strip out the sac, if easily separable. If not, cut off the part in the canal, and return the scrotal part to the scrotum, either with a gauze drain through the lower end of scrotal skin or else (Eisendrath) everted like a hydrocele operation. Pull the testes freely up into the wound whenever necessary. In several cases the scrotal sac formed a hydrocele, requiring subsequent tapping, but in many others caused no trouble. Separate the parietal peritoneum 2 or 3 cm. all around the ring with the finger, so that it is loose from the muscles and can be drawn down freely. Open the sac widely at its fundus and look very carefully all over its interior for adherent omentum or bowel, especially at its neck. Keep this opening under the eye up to the moment of ligating, and watch carefully that nothing slips into it. Simple ligature for narrow sacs, and suture ligature or purse-string closure for large ones, are best. The Macewen pad of the folded-up sac has no great faults or merits. We sometimes use it in atypical large hernias to increase for a time the amount of new deposit at the weak point, but are somewhat skeptical of its permanent value. On account of the loosening of the surrounding peritoneum, the cut-off sac will retract well beyond the muscles. If the stump lies visible in the ring, it is too long, and will form a funnel or dimple inside, tending to bring on another protrusion. If the stump does not disappear wholly, remove more of it.

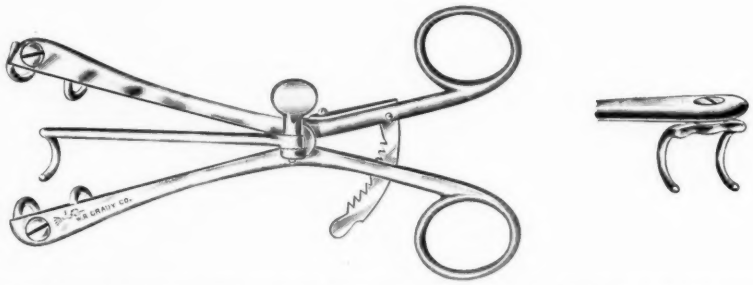


Fig. 1. Author's hernia retractor with swinging suspensory hook for cord. Can be set at any height, and swung back and forth as the deep stitches are being inserted.

STEP 4. *Deep suture.* (*a.* Anterior imbrication.) Place from two to five strong stitches uniting the conjoined tendon and muscles together with the upper segment of external oblique firmly down to Poupart's ligament, all in front of the cord, which is thus pushed backward and toward the pubes. The lower flap of external oblique is left free for step 5.

(*b.* Posterior imbrication.) Lift up the cord on a loop of tape or Andrews's hernia-retractor, which holds the wound open and has an adjustable hook to suspend the cord. Pass the deep stitch behind the cord by first lifting Poupart's ligament on the left forefinger and pushing the needle from outside the fascia behind it. The needle point is guided by the forefinger and cannot injure the vessels. It is vitally important in direct hernias and large rings

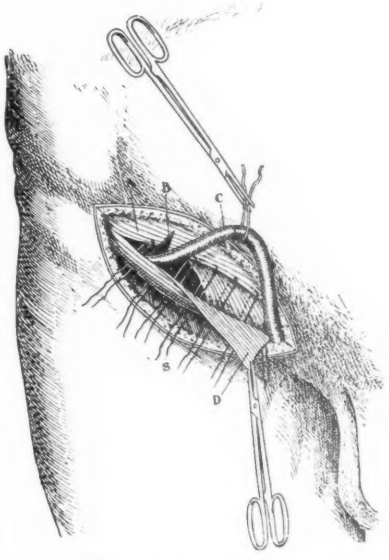


Fig. 2. Mattress deep stitches, in posterior imbrication. A, ext. oblique. C, cord lifted. D, lower flap of ext oblique.

to get the first deep stitch as near the pubic end of the ligament as possible. If often includes a little of Gimbernat's ligament.

Dr. Harris first called my attention to the importance of this, and one cannot commend too much the thorough way in which he clears the structures and fortifies this weak end of the suture line by placing the beginning almost against the symphysis. From its entrance point the needle is guided by the forefinger into the canal. It is then picked up and the opposing muscle entered from within outward. The lowest or first stitch in large rings should include a little of the rectus muscle, the sheath being split open to allow this. In small rings this is not necessary. Do not resort to the Woelfler method of everting a trap-door flap of rectus sheath, or any other mutilating flap methods. The imbrication is of itself a perfect flap transplantation, and will fill the largest rings without great tension. After transfixing the transversalis fascia and conjoined tendon or muscles, we have what would be a Bassini stitch in mattress form. To this we now add the external oblique margin, either in the same loop or by passing the needle, which has already pierced the deep muscle, down and forward through Poupart's ligament and back to catch the external oblique. The needle is next passed out just in front of Poupart's ligament, so that it emerges about 5 mm. in front of where it entered, and surrounds the ligament. It is thus a mattress stitch, with the knot just inside the skin and fat of the groin. From two to five such deep stitches are used. It is a mistake to place them very near together, or tie very tightly. The uppermost or outermost stitch should narrow the ring snugly around the cord. Tie this one first and watch the effect on the cord. Commonly, its artery can be felt pulsating before and after tying. If in doubt, discard the upper stitch.

STEP 5. *Second deep suture.* Lap the lower segment of external oblique upward across the upper. In case the cord has been raised, it goes between these layers. They overlap about 2 cm. at the external ring, thus strengthening and narrowing this dilated orifice. Suture them in this position tight enough to bear part of the strain on the deeper stitches by a lock-stitch running-seam. It will then be seen that the strength of the abdominal wall has been doubled by redoubling its thickness; also, that these overlapped surfaces are more sure to unite firmly than in the edge-to-edge of other methods.

STEP 6. *Skin closure.* After very thorough hemostatis, sew the skin with a trocar-pointed needle held in the fingers. The following form of buttonhole continuous suture will please those who have not seen it.

After the first knot, thrust the needle through both flaps about 1 cm. from their edges. With the skin thus transfixed, wind the slack of the thread twice around the point, instead of once, as in the ordinary lock-stitch. Then draw it up until it is just tight between the stitches, but does not pucker.

There is no back-slip, and each stitch holds by friction. This gives a ridge-shaped suture-line like a double row of stitches. Why it does so, I cannot explain, but no other suture looks like it.

Do not drain these wounds, except in rare cases where there is much dissection and persistent oozing, when it is well to insert a small drain through hips, trunk, and thighs with antiseptic cotton, and put a light cast or starch bandage from the chest to the knees.

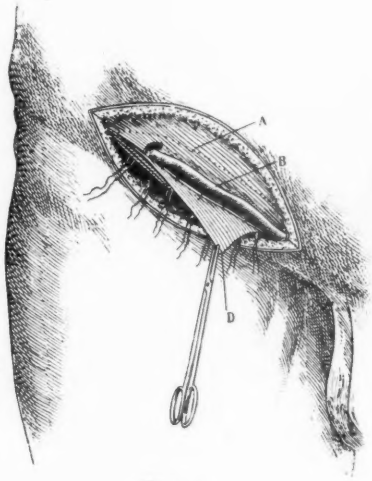


FIG. 3

Fig. 3. Deep stitches tied. B, cord replaced. A, dotted line showing where lower flap D will be overlapped.

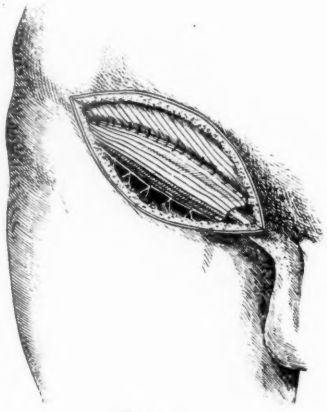


FIG.4

Fig 4. Step 5. Imbricated lower segment of ext. oblique.

an independent buttonhole — not through the angle of the incision.

Seal the wound with collodion. Firmly bandage both groins with wide spica bandages. In children and restless patients it is sometimes well to pad the

There is no advantage in redressing these cases. They are well on the eighth or tenth day, and should be allowed to be up and take ordinary exercise at once. Let no binder or truss be used after discharging the patient.

THE TECHNIQUE OF CLOSURE OF WOUNDS BY REMOVABLE CONTINUOUS SUTURE

BY CHARLES DAVISON, M. D.

In my service at Cook County Hospital, all laparotomy wounds that are not drained are closed by apposing each layer with removable continuous longitudinal silkworm gut sutures.

The suture in the fascia of the abdominal wall is fastened by terminal bow-knots upon the upper surface of the fascia, and the free ends of the suture are allowed to protrude from the wound. The bow-knots are untied by traction on the exposed ends, and the suture removed at the completion of the process of healing.

MEDIAN LAPAROTOMY

The techinque of the suture of the wound in a median laparotomy is as follows: All hemorrhage in the wound in the abdominal wall is stopped by sponge-pressure, by forcipressure, or by torsion; no catgut whatever is used. The edges of the peritoneum are caught with forceps, and are held up,

away from the intestine, by an assistant, and the peritoneum is approximated by a continuous herring-bone suture. (Fig. 1.)

The suture is slightly shirred to take up all the slack, and the ends are left hanging out of the angles of the wound, temporarily held out of the way by snap-forceps.

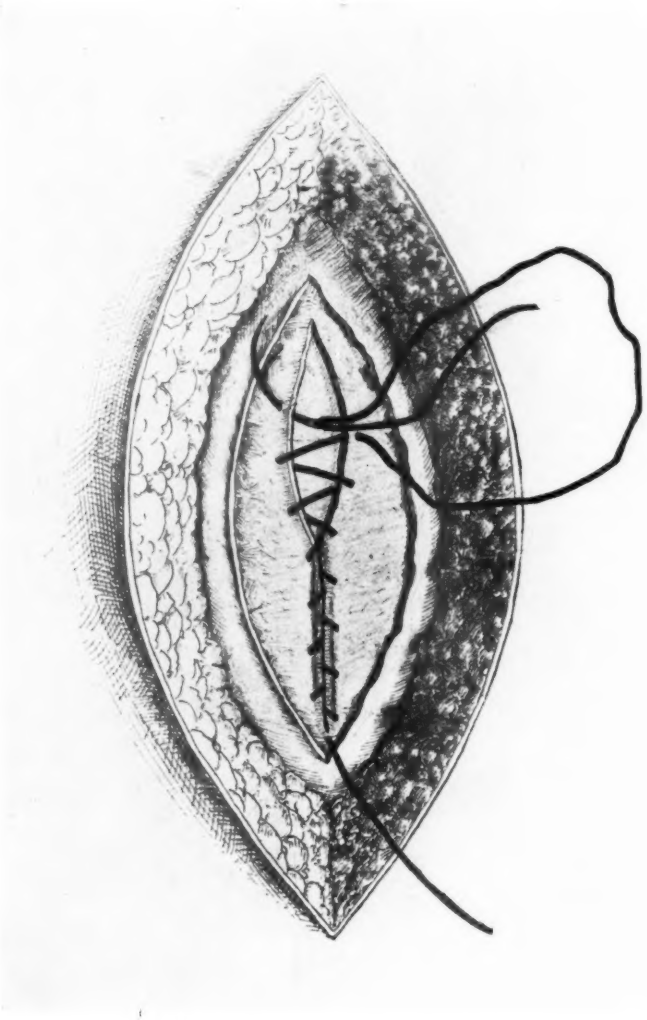


Fig. 1. Median laparotomy. Suture of peritoneum.

In a median laparotomy, the linea alba is the strong layer of the abdominal wall, and if this layer be fastened securely, there can be no spreading of the wound. The edges must be accurately approximated. The fat must be cleaned away, so that there shall be no interposition of tissue between the edges of the fascia, as that would weaken the line of union and predispose to ventral hernia. For this suture a perfect strand of silkworm gut,

soft and pliable from recent boiling, is selected. A small reverse bow-knot (diagram of which, tied and loose, is shown in Fig. 4) is loosely tied ten or twelve centimeters from the end of the strand.

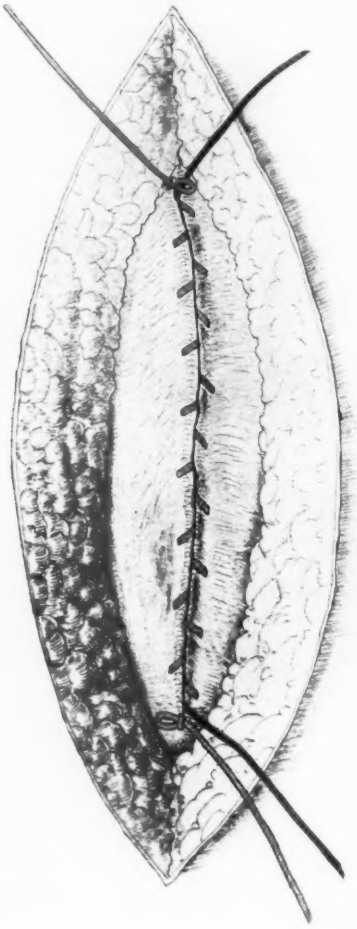


Fig. 2. Median laporotomy. Suture of linea alba tied in position.

The edges of the fascia are caught with forceps and held by an assistant.

The suture is introduced in a firm place in the fascia back from the angle of the wound and drawn up to the knot, and the fascia is approximated by a continuous herring bone suture.

The needle perforations in the fascia are placed about one half-centimeter from the edge and one centimeter apart. At the last stitch the suture is shirred up tightly, grasped by a smooth (serrations filed off) dissecting-forceps at its exit from the fascia, held by an assistant, and another reverse

bow-knot tied below the point of the forceps. (Fig. 2.)

In tying the knot around the forceps, the strand must pass under the forceps, and the loop must pass up from below, or no knot will result.

The greatest care must be used not to crush or fray the silkworm gut with the forceps at the knot, for such a defect might cause the strand to break at that point at the time of removal.

As the bow-knot is intended only to form a body to obstruct the passage of the sutures through the fascia, it should be tied loosely, to make a larger obstruction, and to facilitate its untying at the time of removal.

The ends of the tied suture must not be held

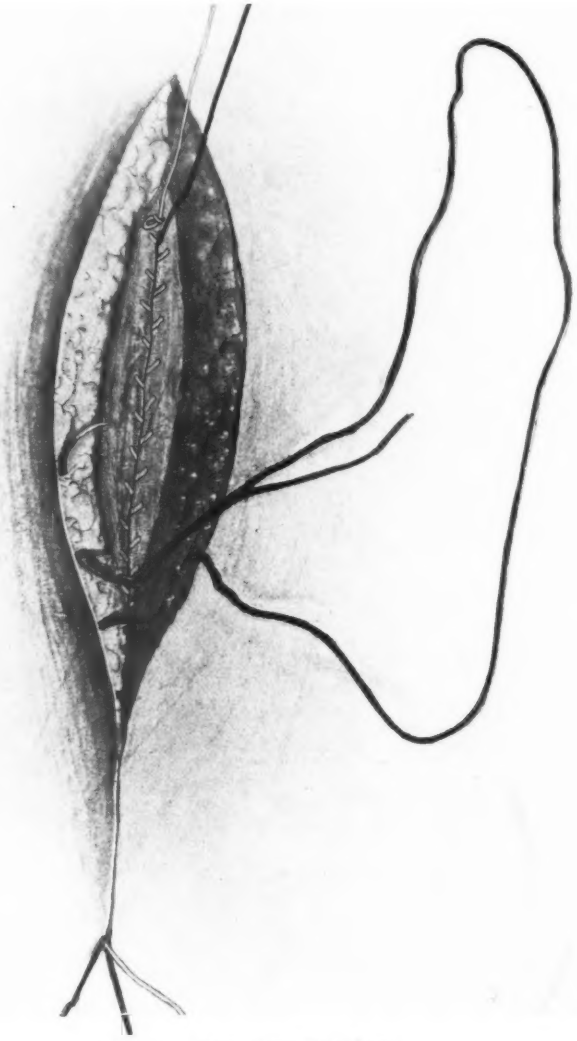


Fig. 3. Suture of superficial layer.

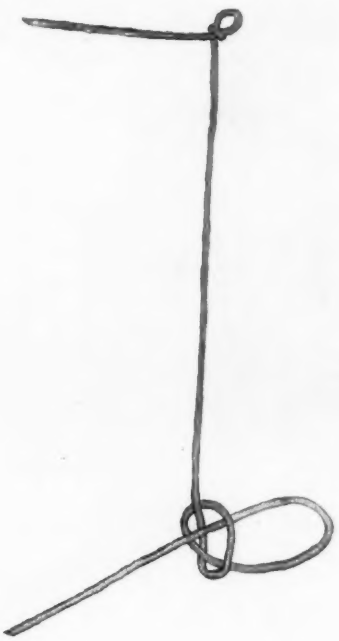


Fig. 4. Diagram of knot.

out of the way by snap-forceps, as their weight might untie the knots.

The linea alba, being securely fastened, takes all of the tension from the other layers, and the unfastened sutures in the other layers do not tend to pull loose.

The skin is closed by the Halstead subcutaneous stitch. (Fig. 3.)

If the patient is very fat, an extra running suture can be placed to approximate the fat and to avoid a dead space.

If the wound is too long to close with a single silkworm gut strand, it is closed in sections, by repeating each suture.

Lateral celiotomies are closed by suturing each layer of fascia with a tied strand of silkworm gut, not allowing muscle or fat to be included in the suture.

INGUINAL HERNIA

The omentum and hernial sac are treated as usual. A round, straight needle is placed in position at or below the neck of the sac, for a continuous mattress suture. (Fig. 5.)

The sac is cut away, the silkworm gut suture is drawn through and shirred up tightly, the ends fastened together and left protruding from the upper angle of the wound; the stump of the sac dropped back behind the internal ring. If the sac is large, and thick, and old, and liable to bleed, it is cut off at the neck, hemorrhage stopped by pressure and torsion, and the edges brought together with a herring-bone silkworm-gut suture. similar to the peritoneum in a median laparotomy, (Fig. 1.)

The conjoined tendon is drawn behind the cord, and its flat surface is attached to the thick underpart of Poupart's ligament by a continuous tied basting-stitch.

The suture with the first bow-knot already tied is passed through the deep, thick, firm, white part of Poupart's ligament, on a level with the lower part of the cord, when it is raised up closely into the upper angle of the hernial opening.

The suture penetrates the ligament from the outside and emerges from its internal surface. The suture is next carried across the opening behind the cord and penetrates the conjoined tendon at the same level one centimeter from its edge, emerging on the peritoneal side of the conjoined tendon.

The suture is then returned through the same tissue in the opposite direction, one centimeter below the former perforations (Fig. 6), completing one unit of the continuous basting or sailor's stitch, which, when completed, is tied in position, with the bow-knots on the outside of the ligament and

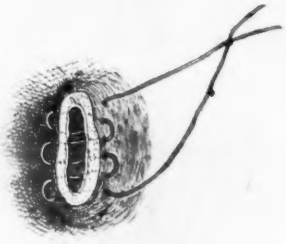


Fig. 5. Inguinal hernia. Suture of the sac.

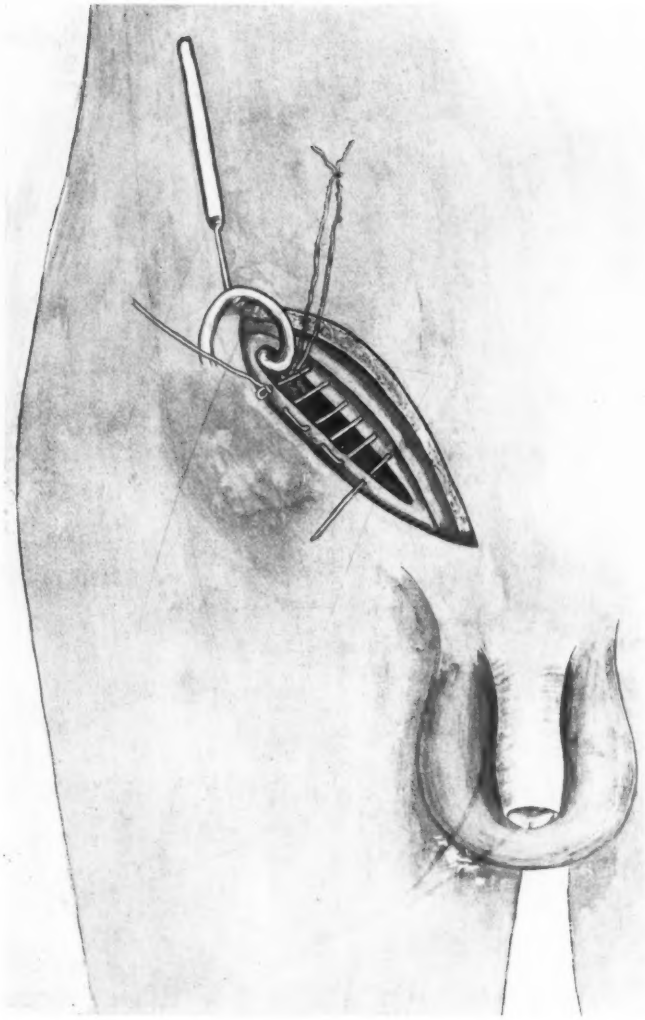


Fig. 6. Inguinal hernia. Basting suture uniting Poupart's ligament to the conjoined tendon.

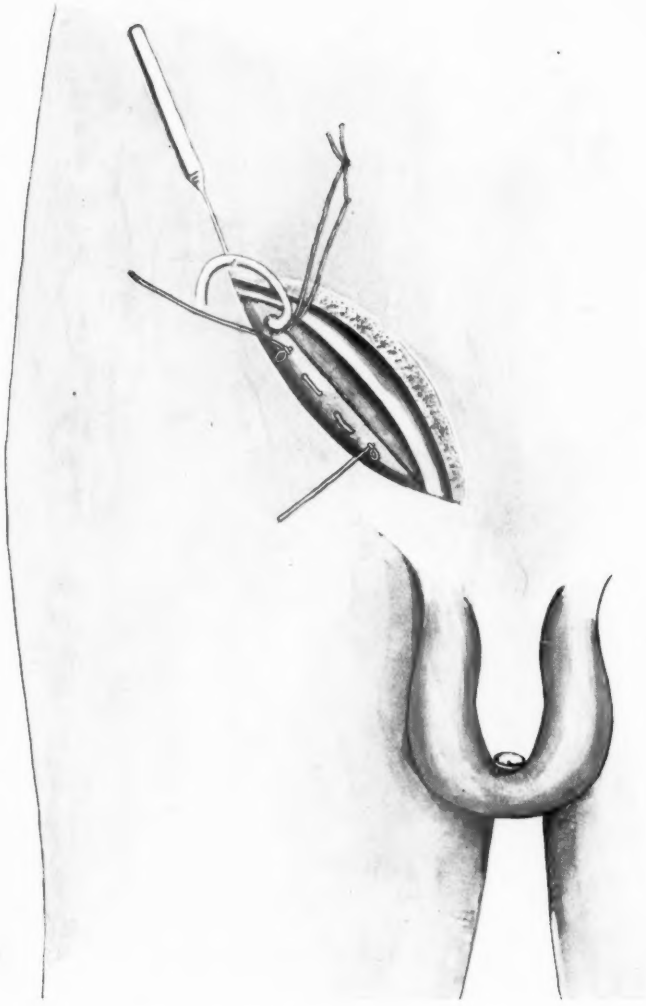


Fig. 7. Inguinal hernia. Basting suture tied.

the free ends extending out at the angles of the wound. (Fig. 7.)

This is the strong layer, and when sutured firmly takes the tension from the other layers.

The fascia of the external oblique muscle is sutured to the edge of Poupart's ligament over the cord with a continuous herring-bone stitch of silkworm gut, the loose ends projecting from the angles of the wound, without being tied. (Fig. 8.)

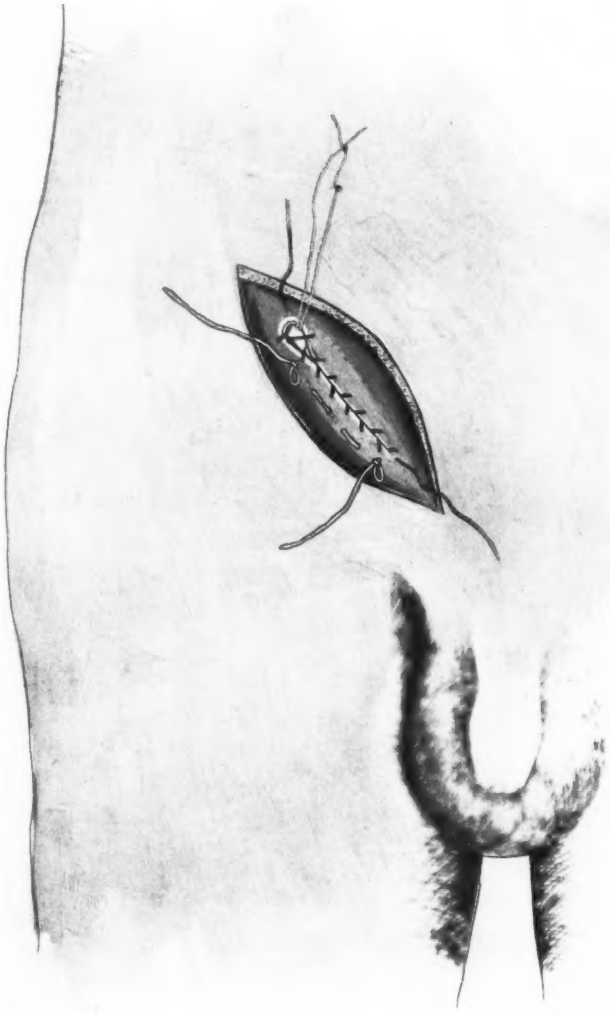


Fig. 8. Inguinal hernia. Suture of fascia of external oblique muscle to Poupart's ligament over the cord by continuous herring-bone suture.

The superficial layer is closed by the subcuticular suture of silkworm gut. (Fig. 4.)

UMBILICAL, VENTRAL, AND FEMORAL HERNIA

Umbilical hernia is repaired by the Mayo method modified by the continuous basting-stitch, tied at either end on the fascia. (Figs. 9, 10.)

The skin is sutured in the same direction to facilitate removal of the deep sutures.

Post-operative ventral hernia is repaired by overlapping the edges of the fascia by the tied basting-stitch. (Fig. 11.)

Femoral hernia is closed by the Cushing purse-string operation, modified by the use of a removable silkworm-gut suture, secured by the bow-knots. (Fig. 12.)

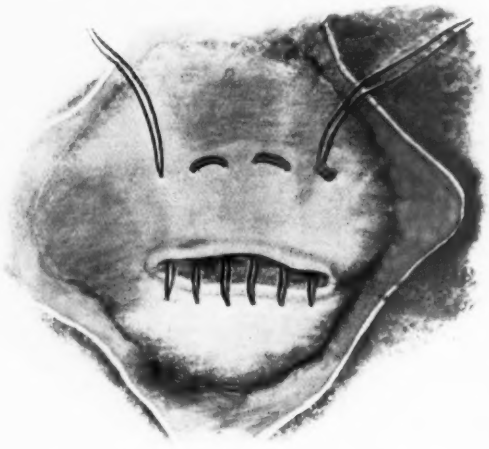


Fig. 9. Umbilical hernia. 1 st suture in position.

This is reinforced by a similar purse-string suture, attaching the falciform process to the pubic portion of the fascia lata.

MATERIAL

1. *Sutures.*— Very heavy strands of Spanish silkworm gut, perfectly smooth and round, thirty-five centimeters long, are selected.

Different colors — white, red (carbol-fuchsine), black (iron-dyed), and blue (methyline blue) — are used for identification during removal of the stitches.

2. *Needles.*— Small Ferguson needles are used in the skin.

Small curved needles are used in the peritoneum and the fascia — round and slender, so that the perforation in the fascia shall be small enough to obstruct the passage of the bow-knot. They are made by taking an oblong-eyed cambric-needle, three centimeters long, annealing it, spreading the eye until it will take the large strands of silkworm gut, bending it to one-quarter curve, and then re-tempering the needle.

3. *Dressings.*— The ends of the sutures which protrude from each angle of the wound, and form capillary drains from each layer, are wrapped in gauze sponges to protect the skin from irritation by them.

A firm mass of aseptic hydroscopic gauze is applied over the wound.

The dressings are held in position by four strips of adhesive plaster tightly drawn across the gauze; the upper and lower strips covering the edges of the gauze. This prevents the patient meddling with the wound, and tends to immobilize the abdominal wall, and gives the wound rest.

4. *Removal of Sutures.*— The sutures are removed in from seven to twelve days.

The surfaces are cleansed with 1-2000 bichloride solution.

The patient's head and shoulders are raised by pillows; the legs and thighs are flexed. This relaxes the abdominal muscles so that the patient cannot hold the abdominal wall rigid and tense, and hinder the extraction of the suture.

The peritoneal suture is taken out first and the skin-suture last.

When the suture that is tied in the fascia is to be removed, it is recognized by its color, a gauze sponge is wrapped around one end to protect it from being broken by the forceps, which are then snapped upon the extreme end, and rolled like a windlass up to the skin. The hand grasps the forceps like a corkscrew, with index and middle

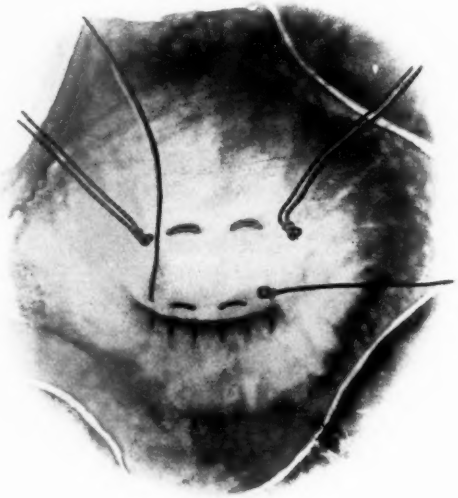


Fig. 10. Umbilical hernia. 1st suture tied, 2d suture in position.

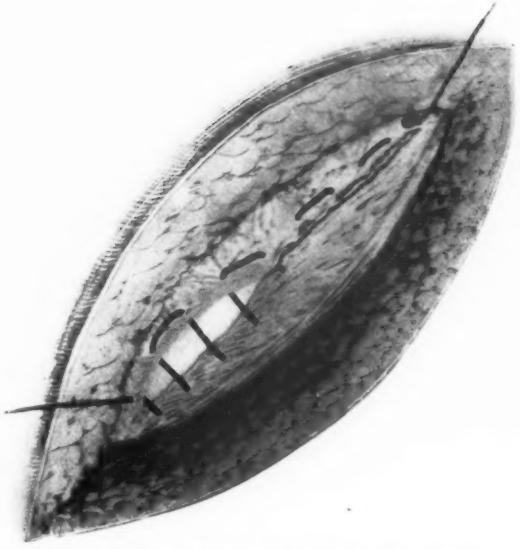


Fig. 11. Postoperative ventral hernia. Basting suture in position.

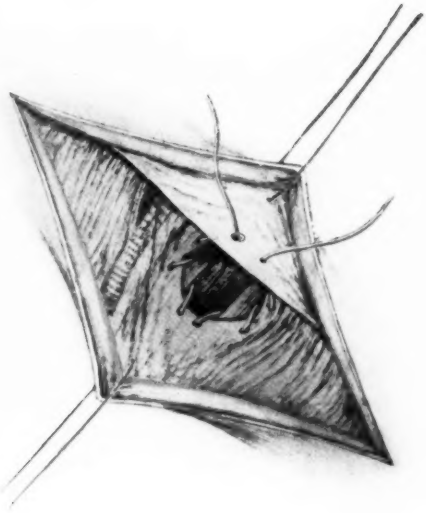


Fig. 12. Femoral hernia.

fingers astride the suture. In this position traction is made until the knot is felt to untie, then this end of the suture is cut three centimeters from the skin.

A sponge and forceps are applied and rolled on the other end in the same manner.

Traction is applied without reference to the bow-knot on that end, and is continued steadily until the suture is out. Steady, continued traction is required. Intermittent, irregular traction tends to wedge and break the silkworm gut.

If the tissue puckers and the suture does not extract easily, it is let alone for a few days, when it can be readily removed.

If, because of a faulty strand of silkworm gut or because of accidental back-stitching, the suture break, traction on the first end, which was left three centimeters long, will remove the other fragment.

The other sutures are removed in the same manner, with the exception of the untying of the first bow-knot.

TRANSACTIONS OF SOCIETIES

TRANSACTIONS OF THE CHICAGO GYNECOLOGICAL SOCIETY

STATED MEETING, NOVEMBER 17, 1905

The President, DR. FRANK T. ANDREWS, in the chair.

ADENOCARCINOMA OF THE UTERUS

DR. HENRY F. LEWIS.— I have two specimens of uteri which were removed for adenocarcinoma of the body, complicated with fibroids. The larger specimen which I show you is one which I removed at the Cook County Hospital. The woman came in with a diagnosis of incomplete abortion, made from the history of exposure to pregnancy, the bleeding, and the enlargement of the uterus. On examination under ether at the time of operation, a large mass was found in the pelvis, which was taken to be the uterus and multiple fibroids. The uterus was removed by supravaginal amputation. Adenocarcinoma of the body was found by the microscope, and therefore the cervix was removed vaginally one week later. There was no discoverable malignant disease of the cervix. The carcinoma involved the entire endometrium and extended into the musculature extensively, but into none of the fibroids. Both tubes were thickened and distended by purulent fluid. All the pelvic genital organs were matted by extensive adhesions into one mass.

In case 2, a specimen of which I exhibit, I performed vaginal hysterectomy at the Columbus Hospital. The patient was referred to me by Dr. Caroline Hopkins for suspected malignant disease of the body of the uterus. The patient, 53 years of age, had been bleeding the last month or so. Curettement, done a few weeks previously, had only brought away benign adenomatous tissue. The uterine body, as you see from the gross specimen, contains two of these adenomata.

The microscopic section of tumor and muscle does not show any signs of malignancy. Several small fibroids are to be seen in the wall and on the surface.

I show these two specimens chiefly because I hope some of the members will talk about them. In the first place, each uterus has a number of small fibroids throughout it, and the question comes up as to the frequency of disease of the endometrium, malignant or adenomatous, in connection with myofibroma of the body of the uterus. A second question comes up as to the propriety of removing the uterus of the second case, in the face of negative histological evidence as to carcinoma in a woman of that age with those symptoms. Those are the chief reasons why I show these specimens, hoping that a valuable discussion may be brought out.

EXHIBITION OF SPECIMENS

1. TUBAL PREGNANCY

DR. T. J. WATKINS. — This specimen is especially interesting because there is an old rupture of the fœtal sac. I present this specimen by the courtesy of Dr. A. B. Miller. The woman had some symptoms at the end of seven or eight weeks, following a normal menstruation, which were supposed to be due to a threatened miscarriage. These symptoms subsided, and she went about as usual, feeling fairly well, and about the eighth month she consulted Dr. Miller, who was engaged to attend her in confinement. On examination he found a peculiar mass in the pelvis. He made an abdominal section and removed this specimen. (Illustration.) The specimen consists of the fœtus, tube, portion of the uterine cornu and placenta, which is partially covered with

Photograph of specimen removed by Dr. J. T. Walkins.

the remnants of the ruptured fœtal sac. The rupture is shown to have taken place near the isthmic portion of the tube. The ampullar part of the tube is apparently unaffected, and the abdominal ostium is open. The large mass is composed entirely of placenta and membranes. The pregnancy was probably of eight months' duration. The changes, which took place outside of the fœtal sac, indicate that the child did not die until some time after the rupture of the sac. It is possible the sac may have been ruptured at the end of seven or eight weeks, when the woman was supposed to be threatened with a miscarriage. The size of the fœtus and its development would indicate that it died at the end of three or four months' gestation.

2. RUPTURED TUBAL PREGNANCY

The pregnancy took place in the ampulla portion of the tube. The specimen contains a considerable amount of decidual tissue, and a fœtus of nine or ten weeks' gestation. The woman from whom this specimen was removed was sent to the hospital with a diagnosis of general peritonitis, and she died a few minutes after admission to the hospital, and the specimen was removed post-mortem.

ABSCESS OF THE OVARY

This specimen, an abscess of the ovary, puerperal in origin, is interesting on account of two conditions: 1. It simulated very much in history and findings a tubal pregnancy; and 2. The patient had only a very slight amount of fever. This woman had a miscarriage, probably produced in the early weeks of pregnancy. She was taken to the Provident Hospital and curetted for a supposed septic abortion. On admission to the hospital she had a temperature of 100°. The next day her temperature was 101°, and a day or two thereafter it came down to 99°, after which she did not have more than 1° of fever at any time. She stayed in the hospital about one week, then left, but continued to have severe pain, and some uterine bleeding. She remained home for five weeks, and then she was referred to me at Wesley Hospital. She was admitted suffering with severe pain in the right side, with absence of fever, with a mass about three inches in diameter, and with some colostrum in the breast. The white-blood count was 10,000. It seemed, on examination, that she probably had a case of tubal pregnancy. In operating we found a tubo-ovarian abscess on the right side and a luteal abscess in the left ovary. This abscess of the right ovary was three or four inches in diameter. The right ovary was removed and the left one resected, realizing at the time the danger of resecting a suppurating ovary. The ovary was resected in this way: The small abscess was incised, and then with a small strip of gauze over the finger the sac of the abscess was wiped away; and it has seemed to me for some time to be very much better, in removing cysts and small abscesses of the ovary, to wipe out the sacs rather than excise them, because it mutilates the organ less, and the sac-wall can be completely wiped out by the use of gauze without much bleeding. This patient made a very satisfactory recovery. Examination of the pus showed that it was sterile, free from bacteria. Smears were taken and cultures also made. There is no doubt that the abscess originated at the time of the miscarriage, so that they were recent. Recent examination of the patient shows that the ovary which was resected, and which was suppurating, is not going to give any trouble.

PORTION OF LEFT KIDNEY, CONTAINING ABSCESS AND CALCULUS

The next specimen is a portion of the left kidney. This woman was operated on about three years previously for stone in the right kidney, and one year later she was operated on for a stone in the left kidney. Following the operation on the left side she had a sinus and a good deal of pain. A second operation was made, but, according to the statements of the patient, very little was found. She came under observation after having a fistula from the left kidney for about one year. She was having much pain, slight fever, and a considerable discharge of pus and urine from the sinus. Doctor Kolischer catheterized the left ureter and did not get any urine from it, and was inclined to think that the left ureter was not obstructed. The kidney was cut down upon and found to be extremely adherent, and in separating the adhesions a part of the upper portion of the kidney was broken off, and on opening it, it was found to contain a circumscribed abscess and a small stone. The cellular infiltration about this abscess had apparently destroyed the blood-supply to such an extent that almost no hemorrhage occurred from the tear in the kidney. The patient is making a slow but apparently complete recovery.

FIBROID TUMOR OF THE UTERUS

Dr. R. R. Smith, of Grand Rapids, Michigan. — The first specimen I wish to show is one of fibroid tumor of the uterus, and I present it simply on account of a rather unusual accident that occurred, which brought the woman to operation. She was forty-two years of age; had been previously well, with the exception of a slight increase in the menstrual flow. She was seized with sud-

den abdominal pain, due to an acute retention of urine. The doctor had some difficulty in withdrawing the urine. Finally, however, he succeeded in passing a metal catheter beyond the obstruction, which was near the base of the bladder. Examination of the vagina revealed the cervix jammed up against the symphysis, and the cul-de-sac filled with this fibroid. There had evidently occurred an acute retroversion of the uterus, which was wedged in the pelvis, pushing the cervix up against the symphysis and impeding the flow of urine. From that time until she was operated a week later, the constant use of the catheter was required. On opening the abdomen we found this enlarged uterus lying in the hollow of the sacrum. It was pulled up without difficulty, and a supravaginal amputation was performed in the usual way. The woman recovered. I show the uterus containing this intramural fibroid. It was somewhat larger in the fresh state than it is now.

DOUBLE DERMOID OF THE OVARY

The next specimen is one of double dermoid of the ovary, removed from a girl 19 years of age. Double dermoids of the ovary are not common. Mantel reports out of 191 cases of dermoid of the ovary 26 double, and Gebhardt reports out of 107 cases 16 cases of double dermoids; so that about one case in 7 of dermoid cysts is double. This is of especial interest to the patient, because of her liability to lose in the operation both ovaries, and as many of these cases occur in young women, it may be a serious matter. In this case we were able to save a large portion of the right ovary. The girl has menstruated regularly since, and has married.

EPITHELIOMA OF THE CLITORIS

The next specimen is one of epithelioma of the clitoris, which was removed from a patient 76 years of age. It is an unusual specimen. Veit reports sixteen cases gathered from various sources, most of them from single observers, very few men having had more than one case. Kelly reports in his text-book two cases in his own experience. In the fresh state the clitoris measured a little more than a half-inch in length and a little less than three eighths of an inch in breadth. On the lower surface of the labia majora on the left side is what I take to be an implantation growth.

PEDUNCULATED FIBROID OF THE LABIA MAJORA

This specimen is so shriveled up that there is not much to be seen. I show it because of its rarity. It is a pedunculated fibroid of the right labia majora which occurred in an unmarried woman 40 years of age. The growth was found to be pedunculated from the labia, about opposite the clitoris. In the fresh state it was approximately three inches in length by an inch and a quarter in breadth. It was covered by normal skin and very soft, resembling in its feel a half-empty bag. On examination with the microscope I was able to make out nothing but fibrous tissue with a good deal of blood-supply.

DISCUSSION ON THE SPECIMENS

Dr. Joseph B. De Lee.— There is one point I desire to bring out in connection with the specimen exhibited by Dr. Watkins, who said that the presence of colostrum in the breast was one of the diagnostic signs that led him to suspect he had an extrauterine pregnancy with which to deal. I have had a great many cases where, three or four years after the birth of the child, colostrum was to be found in the breast, and in one case in particular, much milk was found three years after the baby was weaned. As a sign of pregnancy, colostrum and breast changes in multiparæ are absolutely valueless.

In nulliparæ it is not any more valuable. Neurotic nulliparæ, especially prostitutes, can have colostrum in the breast. I have seen patients with dysmenorrhœa who had colostrum in the breast during the period. Montgomery has found colostrum in the breast in cases of carcinoma of the uterus.

Dr. T. J. Watkins.— In my previous remarks perhaps I did not make myself understood. I did not mention the breast changes as a special diagnostic point. I have recently seen a nullipara who had colostrum in the breast.

There are one or two points in connection with Dr. Lewis's cases that are worthy of discussion. One is the hemorrhage after the menopause, with the absence of malignant findings in the uterine scrapings. I think most of us have had the experience that scrapings from the uterus in malignant disease of the body of that organ sometimes fail to show malignancy. Not sufficient sections are made, or malignant tissue is not obtained in the scrapings. This is so true that it seems to me rather unnecessary to curette a uterus to make a microscopical examination for hemorrhage following the menopause. Hemorrhage after the menopause should be diagnosed carcinoma and treated accordingly.

Dr. Emil Ries.— I have seen some microscopic sections of the specimen of Dr. Watkins. What has taken place is what happens sometimes. The membranes have ruptured and the fœtus was no longer surrounded by the membranes. The membranes have turned back over the placenta. The maternal surface of the placenta is

on the inside of the sac, and what we see is the fœtal surface of the placenta. The attachment of the placenta to the fœtus is not a rare occurrence in extrauterine pregnancy.

I have brought with me an X-ray of a specimen of extrauterine fœtus which I removed some years ago. You can see a shadow of a piece of placenta which has grown fast to the back of the fœtus. I will pass it around as a specimen in which the placenta is attached to the extrauterine fœtus. The microscopic sections are perfectly distinct and easily explain the condition.

DR. FERNAND HENROTIN.— I have nothing to say in regard to the specimens that have been exhibited, excepting with reference to the remarks made on them. It is a rather strong assertion for Dr. Watkins to make, that every case of so-called post-climacteric hemorrhage ought to be considered and treated as carcinoma. I do not think Dr. Watkins intended to convey that impression. The difficulty is to find out and know when the climacteric has entirely passed, and certainly, while I do not want to discourage the removal of uteri that are diseased, still it is very pronounced to say that every woman who has a little bleeding after the supposed menopause is to be considered and treated as a carcinomtous patient. I hope Dr. Watkins will modify his remarks to the extent of saying "persistent bleeding, or recurrent hemorrhage after the menopause."

DR. FRANK T. ANDREWS read a paper entitled CALCIFICATION IN GYNECOLOGY. (See paper, p. 42.)

DISCUSSION

DR. EMIL RIES.— The subject of calcification in gynecology is a vast one, and it would not do to discuss it in all of its phases, and therefore there are only a few points where I may add something to what our President has told us.

It may be interesting to consider the chemistry of these calcareous formations, and to inquire by what chemical processes such calcifications take place. The ordinary calcareous deposit which we find in organs not tuberculous is usually to be explained in the following way. In the first place, in an organ on the verge of degeneration there is decay or decomposition of the nuclei. By this decomposition the phosphoric acid of the nuclein becomes free, and the phosphoric acid, having a strong affinity for the calcium elements contained in the blood or in the tissue fluids, combines with the calcium and forms an insoluble substance, therefore leading to a deposit which is not dissolved again. The degeneration which is usually observed preceding or associated with calcareous areas is a hyaline degeneration. It is quite characteristic of this hyaline degeneration that the nuclei of the cells disappear and thereby the deliverance of the phosphoric acid becomes clear.

In fibroids, where it is well known that the circulation becomes very poor, we may assume that a process of autolysis takes place. In this process, again, the phosphoric acid becomes free, and leads to calcareous deposits. In tuberculous areas we have to consider that the bacillus of tuberculosis contains albumoses, and these eagerly combine with calcium. It is therefore not surprising in gynecological fields, as well as in other fields, that calcareous deposits are frequently associated with tuberculous areas.

This brings up a subject which the Doctor mentioned in his paper; namely, the report of cases in which the tubes have been found to contain masses like lead-pencils or hard nodules inside of them, and which have been proven to be calcareous.

I had the good fortune to operate on such a case about three weeks ago. I exhibit a specimen here which shows exactly such a calcareous lead-pencil formation of the tube. I made a section, not only of the calcareous area, but of the area just outside the calcareous nodule, and I have here the sections for inspection. One of the sections is of a calcareous nodule. Its center shows an amorphous mass, and in it sharp-pointed clefts which are due to cholesterine crystals dissolved out in the preparation of the specimen. Imbedded in the amorphous mass, and particularly in the surrounding hyaline tissue, are calcareous masses showing here and there the concentric arrangement which Dr. Andrews mentioned.

In the sections taken from the tube outside the nodule, there are typical tubercles, showing that we had to deal with a tuberculous tube, with partial caseation and subsequent calcification.

When we find such calcareous nodules on the surface of the tube, we need not assume that they are always tubercular. In a case in which there has been more or less chronic inflammation of the tube, where peritoneal excrescences form on the tube, these excrescences are liable to undergo hyaline degeneration, and calcareous deposits are liable to take place. I have repeatedly found these calcareous deposits, but I did not bring down any specimens of these deposits to show you. At any rate, it is certain that these deposits sometimes take place without there being tuberculosis present.

Apart from these theoretical considerations, I think it is quite important, from a practical point of view, to consider calcareous degeneration in connection with our work.

About three years ago I exhibited before this society a calcified fibroid which I met with in doing a vaginal hysterectomy. I began to remove a good-sized fibroid through the vagina by morcellement and had succeeded in removing a few handfuls of the tumor when I struck a stone,— a hard, calcareous mass larger than a fist,— and as I was not prepared to do a hysterectomy with chisel and mallet, I had to change from the vaginal to the abdominal method. If we examine a fibroid we cannot tell whether its center is calcified or not. It might be advisable, when we feel a hard fibroid which might contain a calcareous mass, to take an X-ray picture, which might indicate a calcareous area by a deep shadow inside the fibroid, and then we might proceed to the abdominal instead of the vaginal operation.

Another thing which I have observed and met with is calcified corpus luteum. I brought such a specimen with me. It is half of one which I removed during a vaginal operation some years ago, and which I described in connection with several corpora lutea which I removed about the same time. If we consider the position of the ovary and its relation to the ureter, it will become clear that it may be possible, if we have to deal with a small calcified corpus luteum, to get an X-ray picture of a small stone in the region of the ureter. An X-ray picture taken for differential diagnosis might mislead us if we found a shadow; we might suspect the shadow to be a ureteral stone, when in reality it would be a calcified corpus luteum.

In order to see whether a calcified corpus luteum would make a shadow as distinct as the shadow of a ureteral stone, I had two stones X-rayed side by side. One is a stone removed from the kidney of a patient, fourteen years old. I removed five of these stones. Besides these stones I X-rayed this corpus luteum to compare the intensity of the shadows. I have a third X-ray taken from three stones which I removed from the kidney of an old woman some five years ago, and here again the stones were X-rayed to see the intensity of the shadow produced by the stones. If you compare the intensity of the shadows, you will find that the calcified corpus luteum is just as likely to give a shadow as the ureteral stone.

There is another point which might be considered. I remember a case that happened some twelve years ago, where, in the abdomen of a woman, was felt a tumor which gave the impression of a fœtal head; that is to say, bony plates could be felt in a roundish mass, and when we compressed or pressed these bony plates, we could get the sensation of crackling as of thin fœtal bones. It was a question whether we had to deal with extrauterine pregnancy, or whether it was something else that produced such an impression, namely, a dermoid cyst with thin bone-plates in the wall. The question comes up, How would the X-ray work in such a condition? The X-ray would show not only the fœtal head, but would also show the spine; and I have here an X-ray view of a fœtus about the size of the tumor which we removed years ago, to show the shadows made by the fœtal head. You may also see the shadows made by the spinal column, which clears up the diagnosis immediately. This was taken from the fœtus I removed, and made after its removal. For comparison I hope Dr. Andrews will bring down some X-ray pictures of dermoid tumors with bony plates.

I wish to add that I do not expect to make a differential diagnosis between an extrauterine pregnancy and a dermoid tumor only by the X-ray, or a ureteral stone or calcified corpus luteum by the X-ray. But there may be occasions where it may be useful to remember these points.

CALCIFIED CORPUS LUTEUM

Dr. Fernand Henrotin exhibited a specimen of calcareous corpus luteum which he removed a few years ago.

Dr. J. Clarence Webster.— The other day I had a case in which a ureteric calculus was believed to exist. It was apparently well demonstrated by the X-ray, but during an abdominal operation for another lesion the mass was found to be a calcified gland very close to the ureter above the pelvic brim. Moreover, it was found that the ureter on this side could be easily catheterized.

I have met also with a difficulty similar to that mentioned by Dr. Ries in attempting to remove a fibroid by the vaginal route, finding that calcification made it impossible to do so, the abdominal incision being required.

I have an interesting specimen of a calcified fibroid which was free from the uterus, and was felt as a hard mass. In this case the differential diagnosis was between an old ectopic pregnancy and a calcified tumor. The diagnosis was cleared up by operation.

I have also another specimen of an old ectopic pregnancy which I obtained several months ago, where, on bimanual examination, the resemblance to a calcified fibroid was marked.

The chemical changes in calcification are of great interest, and probably are not clearly known yet. We have been taught that calcification is either a degeneration or is due to a deficient blood-supply. It is difficult to understand cases of calcification of the placenta. There can be no

question of interference with blood-supply in this position. Possibly, the change is associated with senility in the chorionic elements, though undoubtedly in some cases the small calcified plates which we find on the surface of the placenta are in the superficial portion of the mucosa, which is always expelled to a greater or less extent with the chorion.

The experiments of Litten, made many years ago, are of great interest. In his experiments the renal arteries were ligated for an hour or two, the ligatures then removed, and blood allowed to circulate in the kidneys for twenty-four hours. An extensive deposition of calcareous matter was found in connection with the Malpighian corpuscles. During the period of stasis there was a serous exudate into the Malpighian bodies, and it was supposed that the calcification which followed was associated with some change in this exuded albumin. I do not know whether his experiments have ever been repeated or not, or have been followed up. It strikes me, however, that some interesting results might be obtained by experimental work in animals.

Dr. Adolph Gehrmann (by invitation).—There is very little I can say on this subject, especially after hearing the paper we had the pleasure of listening to the other evening, by Dr. Wells, on this subject, before the Chicago Pathological Society. He took up particularly the chemical side of the question as to the manner in which the deposit of lime takes place.

There is only one thing I might mention in connection with this subject, and that is, tuberculosis as it occurs in the pig. We find, in pigs, bone spicules occurring extremely early, almost as soon as there is any evidence of tuberculosis. It would seem to me, in making post-mortem examinations directly after the animal has been killed, the glands have not undergone a sufficient amount of change to disturb the circulation materially. In other words, there is not a large amount of stasis in the glands. There may be a small area of tuberculosis in which these spicules occur. Maybe the circulation has very little to do with the formation of calculi. Another thing: we see frequently, as in the arteries, plates and spicules occur in connection with the circulation where there is an abundant blood-supply.

Dr. George Schmauch.—What interests us most as gynecologists and obstetricians is the deposition of calcium during pregnancy. We frequently find in a mature child the external surface of the placenta covered with calcium. I have brought down an X-ray picture of a placenta that not only contains on its maternal surface calcium, but also on the fœtal surface. The whole placenta was filled and covered with calcium. On one of the pictures you see the fœtal surface, on the other the maternal surface. There is another picture of a common placenta with normal deposit of calcium on each plate. The deposits of calcium are generally found in the maternal part of the placenta. In this case the villi and also the chorion contain calcium.

We recently regard the placenta as the stomach of the child; we attribute to the chorionic epithelium digestive powers. Finding such enormous calcium deposits on it, one is astonished how the child could have been nourished in the presence of these calcium deposits; yet in this case the child was perfectly healthy, and there were no complications in labor. The process of deposition of calcium during labor is well known, and it is probable that there is not only an increased resorption of calcium from the food, but also a decomposition of the calcium contained in the bone. This condition can be compared to what Virchow calls "calcium metastasis." In the same way as we speak of "osteophytes in pregnancy," a deposition of a bony substance on the surface of the bone takes place a deposition of calcium on the placenta.

Dr. Daniel T. Nelson was asked to participate in the discussion. He said: I can hardly add anything of interest to what has been said. The subject of calcification in gynecological cases has been so thoroughly discussed, that very little can be said. However, in this connection, it may not be out of place to speak of ossification, inasmuch as calcification and ossification are so closely allied, especially as we see cases in our gynecological work, more particularly dermoids. I was hoping the reader of the paper would have touched on that process, because it is so closely allied to calcification. One is pathological, and the other, shall I say, is physiological. Where shall we draw the line between the physiological process and the pathological process, excepting that the physiological process may be an exaggeration of the pathological, or *vice versa?*

One of the speakers referred to calcification of the placenta in pregnancy, and the loss of phosphate of lime in the bones of the mother and the destruction of the teeth. Many of us have observed that a pregnant woman loses her teeth by decay, on account of the loss of lime salts in particular. But that is not the whole process with every child; and in the dermoids we have calcification, and yet it is more than that. How shall we describe the process of calcification — a pathological process — and the degeneration, shall I say, into

a bony substance in which there is deposit of lime and the formation of teeth, etc.?

Thinking, possibly, that that subject might be touched on, it was of interest to me to remember that the lower animals have dermoid cysts, as well as human beings. For instance, sheep may have wool in their dermoid, and birds may have feathers. How are we to determine what will be deposited? Can we in any way determine whether it be a process of calcification, or whether, shall I say, a mere physiological process? As we observe them physiologically, the two processes are closely allied.

Dr. Andrews (closing the discussion).— There was one point I should like to have had brought out, although it is a small item, and that is, the difference in age of the patients in whom we find these interesting specimens of calcification in the ovary and of those in whom we find deposits in the uterus, fibroid tumors, etc. In reading the literature and looking over the hundreds of cases that have been reported, of calcified fibroids, of stones discharged per vaginam, it is a noticeable fact that the ages of the patients run up mostly into sixty, seventy, and eighty; but the ages of patients in whom were found calcifications in the ovaries run into the thirties and forties, so that that one point is worthy of note, and it is perhaps explainable in a certain measure by the fact that we operate more frequently on the ovaries of younger people.

Rudolph W. Holmes, M. D.,
Editor of the Society.

PHILADELPHIA OBSTETRICAL SOCIETY

Stated Meeting, Thursday, November 2, 1905

The President, Dr. Richard C. Norris, in the chair.

MEDICINE AND MEANS FOR THE CONTROL OF POST-PARTUM HEMORRHAGE

Dr. J. S. Raudenbush said that while the causes are many, they produce one of the following conditions: Uterine relaxation, extensive laceration of the birth-canal, and lack of the normal coagulability of the blood. The treatment should be hemostatic, and the measures, dependent upon the cause, existing conditions, and the fact that the hemorrhage may be influenced by shock, syncope, or anæmia. To check hemorrhage and overcome its effects, he suggested: 1. Induction of uterine contractions; 2. Stimulation of the various organs of the body to their respective functions; 3. Supply of fluid to the heart and brain.

Concerning drugs administered by the mouth and subcutaneously, he said that ergot should be given when the uterus is empty, to prevent hemorrhage and free accumulation of blood-clots. Aseptic ergot given hypodermically, he said, will show its effect almost immediately, and he believes its use imperative in serious cases. Strychnine he believed of great value in cases due to exhaustion and inertia uteri. He gives it in doses of gr. 1-40 to 1-20, repeated as indicated. This may be combined with ergot or digitalis, or with morphine when cerebral anæmia exists. Its action, he stated, was through the nervous system upon the uterus. He warned against overstimulation, lest the uterine muscles should become exhausted. He gives digitalis hypodermically in doses of m. x–xxx, or the digitaline, gr. 1-100 to 1-50, and advises its combination with strychnine. He regards adrenaline chloride of value when the hemorrhage is not too severe, of aid to prevent secondary postpartum hemorrhage, and thinks it the best drug for shock. As stimulants he uses strychnine and digitalis, and advises that nitro-glycerine be not used, except for the syncope and shock. Caffeine citrate he regards as an excellent cardiac and cerebral stimulant in syncope. Alcohol (whisky or brandy) may do harm, and is of no service in severe cases. He would give ether hypodermically for a flagging heart, and ammonium carbonate by the bowel in the presence of shock. He advised against the administration of camphor and of quinine, and stated his belief in the value of turpentine when purpura hemorrhagica and hemophiline are the causes. Normal salt solution is administered by enteroclysis, hypodermoclysis, and venaclysis.

Massage and compression of the uterus he believes the best prophylactic and therapeutic measure for postpartum hemorrhage. The hand should be kept upon the uterus for a half-hour or an hour after delivery, for in this way no concealed postpartum hemorrhage is possible. He advised the application of uterine massage, then hypoder-

mics; if not effectual, hot intra-uterine injections. He has obtained no satisfactory results by compression of the abdominal aorta. The patient's feet should be elevated and the head lowered and ice-bags applied to the abdomen.

Regarding Fritch's "rational bandage," he said that the empty uterus is flexed over the pubic bone, pads placed in the abdominal depression back of the uterus and fixed by bandages. The uterine cavity is obliterated and hemostasis is immediate, and nothing need be done for 12 or 24 hours. Venaclysis is regarded as better than bandaging of the limbs. He advised the use of the abdominal binder as a preventive in all cases of labor, also after the checking of hemorrhage. Flagellation of the abdomen he regarded as dangerous in cases of shock. Heat to the body and extremities may be tried when shock is present. Inhalations of fresh air, oxygen, camphor, and ammonia may be of value whenever "air-hunger," syncope, or shock are complications.

Under drugs and means employed within the uterus, he stated that with the failure of uterine massage and hypodermics hot-water irrigations might be used of the temperature of 115° to 120°. Hot-water irrigations were of advantage, used simultaneously with intra-uterine manipulations when the latter were necessary. He has never used vinegar within the uterus. Ice may be of value when hot water fails, but is not antiseptic. Astringent acids were condemned. He thinks there are cleaner and more effectual measures than iodine. Iron in the form of Monsell's solution, formerly used, he does not advocate, nor has he employed tampons. Operation he considered seldom necessary. During the second stage of labor there may be indicated: version, forceps, Cæsarean section, or, perhaps, craniotomy; after delivery: correction of displacements, repairs, clamping of vessels, laparotomy, curettage.

Dr. John B. Shober spoke of the satisfactory results in the use of extract of mammary gland in uetrine hemorrhage from other cause than postpartum hemorrhage. He has used it extensively in hemorrhage due to subinvolution of the uterus following labor, miscarriages, etc., and it has entirely taken the place of ergot in that class of cases in his practice. It has a direct influence upon the uterine muscle, is a stimulation to the circulation, and has no untoward systemic effect, even when used in large doses.

Dr. Daniel Longaker said it had occurred to him to see one case of fatal postpartum hemorrhage, an ordinary case of normal labor in a multipara, and he was cognizant of another. The routine use of ergot after the emptying of the uterus, he believed, would do much toward preventing such calamities. He is not convinced that, following the third stage of labor, ergot is harmful.

The symptom of air-hunger he has never seen, except as a precursor of fatal event. In certain cases, especially those occurring occasionally in placenta prævia, with marked tendency to continuation of bleeding, he believes the gauze pack, sterile or iodoform, is of great value; also, in postpartum hemorrhage, where the placenta has been above the zone of danger, he thinks the gauze pack may be safely used. With or without a vaginal retractor the gauze may be quickly and easily packed to the fundus. In this plan, which he has used occasionally, he has never seen harm result; on the contrary, he considers it a life-saving measure. Of the routine measures, compression of the uterus, employment of hot water of the temperature of 115°, use of gauze and ergot, employing a sterile preparation hypodermically, are the remedial agents upon which he would place reliance.

Dr. Richard C. Norris, President, in response to inquiry, said he believed there were many men who failed to understand the application of the Credé method of placental expression, the important fault being that the expulsion of the placenta is attempted too soon; in other words, before the clots in the uterine sinus have had opportunity to form and become reasonably firm. In the absence of bleeding, it is his custom to wail ten or fifteen minutes before attempting to expel the placenta by this method. Premature manipulation predisposes to bleeding. He goes farther than Dr. Longaker, and administers a dose of ergot as soon as the baby is born. The theoretical objection to ergot, that it is apt to cause the so-called hour-glass contraction of the uterus, is, to his mind, a fallacy. The muscles of the lower segment of the uterus are overstretched, and perhaps paralyzed for several hours, and the action of the ergot for that time is on the upper segment. Furthermore, it helps to promote firm uterine contraction during the first two or three days, and perhaps, in a measure, prevents absorption of toxic products which might enter the circulation through the lymphatic or blood vessels. Referring to manual manipulation, he knows that he at one time saved a patient's life by the application of Fritsch's method, and in conjunction with it compressing the abdominal aorta with the ulnar side of the hand, utilizing the other hand in the vagina by holding the posterior against the anterior lip of the

cervix and crowding it also against the symphysis pubis. When in need of appliances for an emergency, such as a hot douche, a gauze tampon, a hypodermic, etc., instead of trying to help get those things, Dr. Norris said the cool, deliberate obstetrician would direct the frightened assistants while he temporarily controlled the hemorrhage by holding the uterus in his grasp. He regards the method of extreme value in the emergency of serious postpartum hemorrhage. He also attaches great value to the use of the intra-uterine tamponade, and when the hot douche and external and internal manipulations fail, he believes the one thing to do is promptly to tampon the interior of the uterus from fundus to vagina. He does not use iodoform gauze, if he can avoid it. After 24 hours the gauze is gradually withdrawn.

He thinks that adrenaline solution has not been demonstrated to be more valuable than ergot. He has found it of value in shock, employed in conjunction with salt solution by hypodermoclysis. Neither would he hesitate to use it in conditions of shock independent of postpartum hemorrhage. In one patient in the last stage of malnutrition from poverty and starvation with the proportion of hæmoglobin between 15 and 20 per cent, the woman having spontaneously delivered herself of her baby, there was persistent oozing of a blood-tinged serum, although the uterus had firmly contracted. In spite of all that could be done, the woman oozed to death in the course of four or five days. Dr. Norris believed that the blood was so low in the constituents favoring the formation of thrombi that the fluid, although repeatedly added to by salt solution, oozed through the uterine vessels until the patient died. A tampon saturated with adrenaline solution and packed in the uterine cavity would probably have favored firm contraction and the formation of thrombi. He is not satisfied, however, that its action upon the musculature of the uterus can equal that of ergot.

Dr. William R. Nicholson believed that true cases of postpartum hemorrhage are relatively rare. He referred to the instructions given by Dr. Joseph Price, that the obstetrician's duty was to place the hand upon the abdomen over the uterus as soon as the child had been born and to keep it there until the placenta was delivered. With this carried out as a prophylactic measure, he believed there would be many fewer cases of moderate bleeding following deliveries, although he does not mean that this would do away with all bad cases. Mammary gland he believed would be of value, if at all, only in cases such as Dr. Norris referred to, in which the woman oozed to death. He also had knowledge of a similar case. In the treatment of hemorrhage the two methods of most value, in his opinion, are Fritsch's and that of tamponning the uterus with gauze. He urged that in the increased frequency of appendectomy during pregnancy, the attendant upon a case with such operative history should especially guard against postpartum hemorrhage. He referred to such a case in which adhesions offered the only explanation of fatal termination.

Dr. Raudenbush, in closing, said he thought there were opportunities for testing, without risk, the value of the mammary gland. While he never uses ergot until the uterine cavity is entirely empty, its effect is very marked and very prompt. He cited a marked case of "air-hunger." He had done version, and all the conditions seemed to be favorable. Before leaving, however, he made a routine examination, found the pulse very rapid, and the patient stated that she felt rather queer; that things seemed to be very far away, and that she needed more air. Examination showed a fully distended uterus with clots, and the case gave every appearance of being desperate. From fourteen to sixteen quarts of water were used in douching, but upon cessation of this or removal of the hand from the uterine cavity, the uterus relaxed. Hypodermics of strychnia and ergot were given, and the uterus kept contracted by one hand within and the other on the outside. In this way the case was controlled. In another case there was recovery, but with a long convalescence, on account of the anæmia. With sufficiently active manipulations of the uterus externally and internally, and with the administration of strychnia and ergot, Dr. Raudenbush believes it is possible to save even these cases of air-hunger. He has never felt that he could rely upon the gauze tampon, and is afraid to use it, unless other measures fail.

He asked the President whether he removes the placenta immediately after the child is delivered when the patient has been under an anæsthetic.

Dr. Norris replied that it is his custom in forceps delivery to have the patient pretty well out of ether when delivering the placenta. He regards it unwise to have a woman completely anæsthetized in the third stage of labor. She should be fairly out of the ether, so that she will not be relaxed and unconscious during the third stage. As soon as she is out of ether enough to swallow, he gives a dose of ergot, gently stimulates the uterus by light frictions over the fundus, to keep it well contracted, and proceeds to the expulsion of the placenta after ten or fifteen minutes,

so long as there is no bleeding and the uterus remains contracted. Sudden relaxation and bleeding, he said, demand at any time immediate expulsion of the placenta.

EMBOLISM FOLLOWING ABDOMINAL SECTION

Dr. Wilmer Krusen said that, according to Dearborn, reviewing the work of twenty-five surgeons, thrombosis and embolism were more common after operations in the pelvis than after operations in any other part of the body. In a *résumé* of 7,130 gynecological operations, Schenck reports 48 cases of thrombosis. Dr. Krusen reported five cases, four of which ended fatally, occurring in twelve years of gynecological practice. The symptoms in the fatal cases were similar. The attack was characterized by precordial distress, severe pain and dyspnœa, with quickened pulse anxious expression of the patient, who gasped for breath with the aid of all the auxiliary respiratory muscles. The face was cyanosed, with the occurrence of cold, clammy sweat. As a rule, the mind remained clear. Death occurred in a few minutes, in spite of energetic stimulation. The fifth case reported manifested the same symptoms, but recovered. Dr. Krusen referred to Mahler, who, aside from the clinical symptoms, laid great stress upon a persistent frequency of the pulse-rate out of proportion to the temperature elevation, and quoted Kelly, who says "that the fact that these cases occur teaches anew the important lesson that the surgeon is never warranted in guaranteeing the recovery of the patient, even after a seemingly simple operation. Patients whose vitality is depressed and those who are anæmic should be watched with especial solicitude." Dr. Krusen believes it probably possible, by a careful study of the blood before operation, the avoidance of excessive loss of blood during the procedure, and the use of saline infusions after the procedure, to diminish the number of such cases. In anæmic cases a longer rest in the absolutely recumbent position, with the avoidance of all exertion or straining for a longer period than is customary, was advised.

Dr. William R. Nicholson was impressed with the fact that embolism might occur in the simplest form of cases. This had been observed in a study of the question carried out at the University. The conclusions of the investigation were in line with Dr. Krusen's suggestion that the condition was produced by the pressure of the retractors upon the internal abdominal vessels.

Dr. Collin Foulkrod said that in his study of the literature of the cases made a year ago he had found that Dr. Krusen's statements had been borne out in almost all the cases. Some of the German authorities say that the patients exhibiting a primary bronchitis were more subject to pulmonary embolism than those who did not, and that even when the affection was slight the pulmonary embolism could be traced to this slight disturbance of the bronchial tubes. In cases of fibroid conditions of the uterus with great anæmia, and in those showing great shock after operation, he thought there was a pronounced tendency to thrombosis or emboli. It would seem that the anæmia and the shock, added to the increased fibrine in the blood of the pregnant woman, produced many cases of embolism in pregnancy. The puerperal embolism he considered quite common, occurring usually from some exertion of the patient. In one case of hysterectomy which he saw die from pulmonary embolism and heart-clot, in which there was no evidence of anything wrong in the operation, there was a clot not bigger than a filbert in the broad ligament, and the post-mortem showed undoubted heart-clot. In the three cases he had seen of death from embolism, the respiration stopped first, then there could be heard and felt the heart beating from one to three minutes after the breathing had stopped, as if there were something plugging up the pulmonary artery, and the heart was pumping tumultuously in order to drive that out. He could see no relation between the small blood-clot in the broad ligament and the pulmonary embolism, and suggested the existence of a reflex influence. The condition of the patient from the anæmia before the operation would have more to do with the pulmonary embolism than the blood-clot occurring at the time of the emboli.

He called attention to the impossibility of telling the exact cause of death in these sudden terminations, and cited the case of a man operated on for ulcer of the first part of the duodenum. Two days afterward he developed rapid heart and rapid respirations, and died in a short time. There was a clot in the heart, which, while not exactly the type that would be found post-mortem, was one of adherent white fibrine, seemingly antemortem. Apparently, there had been inability to bear the shock, accompanied with the extreme anæmia and the coagulability of the blood. Dr. Foulkrod believes that there are many patients who die suddenly, in which cases the surgeons and other men do not attribute the death to any form of pulmonary embolism, and in which they have been led astray by the associated symptoms, who die from the presence of the heart-clot and subsequent embolism.

DR. RAUDENBUSH cited a similar case in an abdominal operation. About thirty-six hours after the operation, though apparently bright and doing well, the woman suddenly died before the resident physician could reach her.

DR. RICHARD C. NORRIS believed that every case of sudden death should have a careful autopsy made before a final diagnosis was made. He cited a case of confinement with a perfectly normal convalescence for eight or nine days. The woman sat up in bed, and suddenly died, with all the clinical symptoms of thrombosis. Autopsy showed nothing in the way of embolism or thrombosis. She had, however, a myocarditis, which allowed her heart to be overtaxed by any exertion. He believed that some of the sudden deaths after operation were due to myocardial conditions associated with anæmia, prolonged anæsthesia, and a heart that had been doing its best during convalescence suddenly gave out. He referred to a case at present under observation who had had hysterectomy for fibroid. Considerable blood had been lost and her hæmoglobin was between forty and fifty per cent. Within twenty-four hours after the operation a cardiac storm had struck her, accompanied by alarming dyspnœa. He at first though the condition pulmonary embolism, then that there was bleeding. To be sure of the latter, he gave her a whiff of nitrous oxide and opened the posterior cul-de-sac, but found that she was not bleeding. Under stimulation her pulse came down, and she subsequently made a perfect convalescence.

This was a case which one might say was embolism that recovered. He believed, however, that the trouble was myocardial. Pulmonary embolism he regarded as the saddest accident that could occur in surgical and obstetrical practice. The last case of the kind in his own practice in gynecological work was a patient three or four weeks convalescent. She had telegraphed her husband to come for her the following day, but the telegram had scarcely reached him before she was dead. In reviewing the histories of his gynecological cases, and bearing in mind the title of Dr. Krusen's paper, he said he could recall several sudden deaths of this kind. Unfortunately, he had never had a case which he could demonstrate by autopsy. He thought it of the greatest importance to men working in this line to have autopsies in persons dying suddenly from gynecological or obstetrical conditions.

DR. KRUSEN, in closing, referred to the well-known difficulties in securing autopsies; on none of his patients could it be performed. One of the patients had died six hours after operation; another on the fifth day, with normal pulse and temperature five minutes before. The one patient whom he reached before death recovered. He thought the symptoms detailed bore out more nearly the diagnosis of embolism than that of any other condition.

ABSTRACTS OF CURRENT LITERATURE

DEPARTMENT OF SURGERY

UNDER THE CHARGE OF

JOHN B. MURPHY, M. D. — E. WYLLYS ANDREWS, M. D.
FREDERIC A. BESLEY, M. D. — WM. R. CUBBINS, M. D.

CERVICAL RIB WITH RESULTING GANGRENE OF FINGERS. By W. Wayne Babcock.

The writer reports a case of cervical rib, the most interesting feature of which is a gangrene of the fingers. The patient was twenty-two years of age, and had always been sickly. At the age of thirteen he noticed a stiffness of neck, and during cold weather the right hand became pale, cold, and benumbed. Two years ago, the middle finger became abraded, and refused to heal. About a year ago, terminal phalanx became gangrenous. Later, the third and fourth fingers became involved. Careful examination revealed a right-sided cervical rib. There was no radical pulse palpable on that side. The rib was removed and the fingers healed over. Subsequently, there was a small radical pulse palpable. Dr. Babcock lays particular stress on the observation that angulation of the artery, and not compression, is the cause of the ischemia.—*American Medicine*, Oct. 7, 1905.

CHRONIC ULCER OF THE STOMACH AND FIRST PORTION OF THE DUODENUM, WITH ESPECIAL REFERENCE TO SURGICAL TREATMENT. By William J. Mayo, A. M., M. D., Rochester, Minnesota.

Chronic ulcer of the stomach and first part of the duodenum is much more frequent than one would suppose from the present clinical statistics; the places where the most thorough autopsies have been performed showing an average of from 10 to 20 per cent, with 10 per cent of them duodenal, as against the clinical records of 1.5 per cent, while the surgical findings are much more frequent, and the frequency of the duodenal to the gastric ulcer is raised anywhere from 25 to 50 per cent.

The acute perforating ulcers are usually superimposed upon the chronic ulcer. The duodenum above the entrance of the common bile-duct is the location of these duodenal ulcers, because it is exposed to the same irritating influences as the stomach, and it is also more easily perforated, because it has very much thinner walls. In our statistics of 13 perforating ulcers, 6 were in the stomach and 7 in the duodenum; in Moynihan's 22 cases of perforation, there were 15 gastric and 7 duodenal.

In considering our operations for the last two and one half years, in which a gastric jejunostomy was performed, we find 231 cases that were performed for either gastric or duodenal ulcer. Of these, 119 were males and 112 females; 158 were gastric, 60 duodenal, and 14 duodenal and gastric; in 20 cases of the duodenal, the ulcer extended up to and involved the pylorus. In other words, out of 231 ulcers the duodenum was involved 74 times, — 55 times in males and 19 time in females.

For clinical purposes it is best to classify into two groups — the "indurated" and the "non-indurated."

The indurated involves all the coats, is a milky-white color, shows some scar contraction, is usually located on the pylorus in the stomach cases, and is of a saddle-shape, the flaps hanging on the anterior and posterior sides. In these cases there is usually some obstruction to the pylorus, due to the infiltrated tissues. In about 20 per, cent more than one ulcer was found. Nearly all of the duodenal ulcers were indurated — 68 out of 74.

The second variety — or non-indurated — have also been termed the medical or clinical ulcer. We have the most definite symptoms and the smallest amount of anatomical change. Eighty out of 231 were of this—type 56 females and 24 males. The ulcers were of two varieties: 1. The mucous erosion; and 2. The typical round, peptic, or fissure ulcer. It is, at times, almost impossible to locate these lesions by inspection or palpation, and once could be found only because of a hemorrhage.

It is usually, however, a sentinel gland in the gastric hepatic omentum,— that drains this portion,— while malignant glands are in the lesser omentum. Sometimes this is present in cases of cholecystitis.

The treatment advocated is surgical, because

of the recorded number of failures from medical aid, and method advised is a gastrojejunostomy with no loop, so that it will be possible to avoid the biliary regurgitant vomiting. A careful and systematic examination is advised, so as to avoid errors in diagnosis, for in these the author believes lie the failures of surgical relief.— *Journal of Amer. Med. Ass'n*, Oct. 21, 1905.

Extrophy of the Bladder Successfully Treated by Peter's Method. By Harry M. Sherman, M. D., San Francisco.

Dr. Sherman reports a single case of the implantation of the ureters into the rectum, and quotes several others from the literature, that have been successfully performed, and which are still alive and well, four years after the operation. The method consists in the separate implantations of the ureters, with the vesical mucosa left over each orifice, into the rectum, by going down in the properitoneal space to avoid a peritonitis.

The ureteral ends are left free in the rectal cavity, and the tube is fixed only very slightly to the rectal wall. The rectum soon becomes accustomed to the urine, and is voided at first from one to two hours, and later every three to four hours. The urine usually is acid, shows some albumin and a very few crystals, but there is no sugar, and practically no feces.

An examination of the rectum shows the small tips of the ureters hanging free in the cavity. It is urged as being superior to the Maydl operation, on account of the mortality from invading the peritoneal cavity and the faulty junction between the rectum and the trigonum, and the fact that the urine is placed into the sigmoid, where the feces accumulate, and is normally retained.— *Journal of Amer. Med. Ass'n*, Oct. 7, 1905.

The McGraw Ligature. By A. J. Ochsner.

Dr. Ochsner reports 124 cases of pyloric obstruction that were due to different etiological factors, in which a gastroenterostomy has been performed with a McGraw ligature, and quotes the results. The operation used is given in a concise, definite manner. Twenty-eight were operated for carcinoma, and five died of exhaustion, as they were reduced when the operation was performed.

In 96 operations for conditions due to ulcers or adhesions, and not malignant, there were 5 deaths; but these cases were complicated with other troubles, which were the determining factors in the result.

The reasons advanced for the operation were as follows:

1. Anastomosis with the McGraw ligature can be accomplished in a satisfactory way — (*a*) Between stomach and intestines, and (*b*) Between intestine and intestine. (?)
2. The opening can be made any desired length.
3. It can be made without carrying infection material from the lining of the stomach or intestines to the peritoneum.
4. It can be performed quickly.
5. It requires no skill or ingenuity.
6. The patient shows very little, if any, shock after the operation.
7. The patients are relatively very free from pain, and can usually sit up in bed with the aid of a head-rest a few hours after the operation.
8. The method should not be employed in making a pyloroplasty.
9. It should not be used in making a cholecystenterostomy.— *Journal of Amer. Med. Ass'n*, Oct. 21, 1905.

Inguinal Hernia of the Bladder. Report of a case; remarks on diagnosis. By S. C. Plummer, M. D.

Patient.— H. E. R., aged 40, locomotive-engineer, on December 24, 1903, jumped from his engine, which was about to leave the track. He struck on his feet, which slid out from under him, allowing him to fall heavily on his buttocks.

Examination.— Left inguinal hernia. On the right side there was no sign of a testicle, either in the scrotum or in the inguinal canal, and the patient said there never had been.

Operation.— June 16, 1904, after making the usual incision, a thick-walled sac, containing much fat, was separated with some difficulty from the surrounding tissues. The sac was the size of a large walnut, and had a neck easily permitting the ends of three fingers to be passed through it. The opened sac was found to contain omentum and bowel. It was ligated and cut off.

In an ordinary case I should have proceeded to sew up the inguinal canal, but in this case there was so much fat in the canal that I thought best to dissect away some of it. In doing this I discovered another sac to the inner side of the first. This sac was about one and a quarter inches long and a half-inch in diameter, with a neck slightly less in diameter. In structure it resembled the average hernial sac of peritoneum, and on exploring with the finger I found that the opening led down behind the pubic bone; no intestine or

omentum could be felt. I was at a loss how to account for this second sac. In view of the absence of the testicle on the opposite side, the possibility that this had some connection with a misplaced funicular process occurred to me. I put a ligature around the neck and cut away the sac. Then I was struck with the thought that perhaps I had to do with the bladder. I removed the ligature, and on holding apart the edges of the wound, I could see fluid. I passed a sound through the urethra, and on pushing an artery-forceps through the neck of the sac, the two came in contact. The fluid which I saw was, of course, urine.

Being now sure that I had a wound of the bladder, I proceeded to repair it, using two layers of continuous catgut suture. The wound was not more than an inch long, and was in the extraperitoneal portion of the bladder.

The inguinal canal was now closed by the Ferguson method, with the exception of about one inch at the lower inner end, where a gauze drain was inserted down to the bladder. A catheter was passed into the bladder through the urethra and allowed to remain there.

After-treatment.—The patient made an uneventful recovery. On the fifth day I removed all drainage and inserted two catgut sutures through the aponeurosis of the external ablique and conjoined tendon above and Poupart's ligament below, also two silkworm-gut sutures through the skin, under nitrous oxide gas anæsthesia.

Result.— Primary union.

Since the radical operation for the cure of hernia has become so common, it has been learned that hernia of the bladder occurs more frequently than was formerly supposed.

Why is it that the various operators who have reported cases have almost invariably been puzzled as to the identity of the structure with which they had to deal when meeting with a hernia of the bladder for the first time?

I think it is because we have been taught to regard this condition as a curiosity, and so have failed to be on the outlook for it. In any case, the feature which deceived me was the appearance and structure of the sac itself. It did not at all resemble the normal bladder-wall, and probably was devoid of muscular tissue, as the herniated portion of the bladder frequently has been found to be. Its thickness was about that of a blotting-paper. The absence of the testicle on the opposite side added to the confusion by suggesting some anomalous arrangement.

Inguinal hernia of the bladder is almost always accompanied by intestinal or omental hernia.

Clinical symptoms suggestive of the presence of the bladder in an inguinal hernia are difficulties in passing urine, the enlargement of the hernia when the bladder is full, and the fluctuation in the tumor. Hernia of the bladder generally occurs in adults.

Conditions which lead to the suspicion of the presence of the bladder during operation are the presence of an unusual amount of fat in the inguinal canal, the location of the tumor, the difficulty of separating it from the true hernial sac, the recognition of its musculature when present, the possibility of passing a urethral catheter or sound into the hernia, and the large size of the inguinal opening, out of proportion to the size of the protruding intestines.

The herniated portion of the bladder is always found to the inner side of the true hernial sac. As a rule, it lies to the inner side of the spermatic cord instead of in front of it, as the ordinary inguinal hernial sac does. The pedicle of the herniated portion of the bladder leads down behind the pubic bone into the true pelvis.

If the bladder has been wounded, it may be identified by the presence of urine and by the possibility of passing a metal instrument through the wound and bringing it in contact with a sound passed into the bladder through the urethra.

The bladder has been mistaken for the true hernial sac, for a lipoma, for peritoneal fat, for omentum, for a cyst, for a thickened patch in the sac-wall, for a hydrocele of the cord, for a sacculation of the colon, and finally, as in my case, for a second hernial sac.

In the radical operation for the cure of inguinal hernia as done to-day, the neck of the sac is drawn down as far as possible in order to ligate off the sac as high as possible. In doing this the neighboring parietal peritoneum is also drawn on, and through it traction may be made on the bladder. In case of a recurrence of the hernia after operation, it can readily be seen that the bladder would be quite likely to be present in the hernia. In operations for recurrent hernia, therefore, we should be particularly on our guard against wounding the bladder.— *Journal Amer. Med. Ass'n*, July 22, 1905.

ABSTRACTS OF CURRENT LITERATURE

DEPARTMENT OF GYNECOLOGY

UNDER THE CHARGE OF

J. CLARENCE WEBSTER, M. D. — E. C. DUDLEY, M. D.
JOHN C. HOLLISTER, M. D. — F. W. LYNCH, M. D.

DILATATION AND CURETTEMENT FOR DYSMENORRHŒA: A report of ninety-five cases. By Gerry R. Holden.

With the view of ascertaining the actual value of dilating and curetting in the treatment of dysmenorrhœa, the author has tabulated the post-operative histories of 95 cases which were operated in the Johns Hopkins Hospital with the above indication. Attention is called to two varieties of dysmenorrhœa.

1. *Primary.* — The organs are normal, or else merely poorly developed. Symptoms frequently date from debilitating illness, and apparently are caused by anæmia, malnutrition, and neurasthenia.

2. *Secondary Dysmenorrhœa.* — Those in which various pathological conditions of the pelvic organs may be predisposing factors.

All of the 95 cases were examined under ether immediately preceding the operation, and were adjudged to be of the primary type. The results of treatment are tabulated in the following classes:

1. *Complete or very great relief for a year or more, with no subsequent return of the dysmenorrhœa.* In this class are 32 cases, or 33 per cent of the entire 95 cases; 18, or 18 per cent of the total series, were absolutely relieved, and 14, or 14 per cent, were very greatly relieved.

2. *Complete or very great relief for a year or more, with subsequent return of the dysmenorrhœa.* In this class were 7 cases, or 7 per cent of the 95 cases; 3 cases being completely relieved, while 4 cases were very greatly relieved.

3. *Slight or moderate relief for a year or more.* Eight cases, or 8 per cent of the series. Periods from operation to report varied from one to nine years.

4. *No relief, or relief lasting for less than one year.* Forty-eight cases, or fifty per cent of the series. There was no relief whatsoever in 28 cases, or 30 per cent of the total series. The remaining patients had a certain degree of relief, in some cases very marked, but in no instance lasting for a year.

Holden considers that the treatment was successful in the first two classes; that is, 40 per cent were entirely or very greatly relieved for at least one year; while of the 60 per cent of "unsuccessful" cases, half received no benefit whatsoever, and the other half received benefit which was either so slight or so transient that the operation could not be called successful.

Various conditions were noted in the cases of the series. Thus 57 were of a more or less marked neurasthenic type, 40 were anæmic, etc. With a view of ascertaining whether these various conditions were of prognostic value, the author tabulated the cases as follows:

Condition noted.	Total number of the cases in the series of 95 cases.	Number of cases in which treatment was successful.
Anæmia.	41	17, or 41 per cent of the anæmic cases.
Neurasthenia.	57	20, or 35 per cent of the neurasthenic cases.
Malnutrition.	29	12, or 41 per cent of the cases with mal nutrition.
Good nutrition.	31	13, or 41 per cent of the cases with good nutrition.
Poorly developed pelvic organs.	20	5, or 25 per cent of the cases with poorly developed pelvic organs.

Of the entire 95 cases, 40 per cent were successfully treated. Comparing the results of the cases with anæmia, neurasthenia, malnutrition, and good nutrition, we find that there is little variation from the 40 per cent of successful cases of the series. The cases with poorly developed pelvic organs, however, presented but 25 per cent of "successful" cases.

Analysis of the character of the menstrual pains and their duration yielded valuable *data* from the prognostic standpoint. Of the cases in which the pains began on the day of the flow, or the day previous to the flow, 17, or 51 per cent, of 33 cases tabulated were successfully treated. Of the 14 cases in which pain preceded the menstrual

flow for more than 2 days, only 2, or 14 per cent, were successfully treated.

Grouping the cases according to the character of the pain, it was found that 50 per cent of the cases with sharp or paroxysmal pain were successfully treated, in contrast with 27 per cent of successful cases with dull pains. In like manner it was found that cases in which the pain lasted but one or 2 days afforded a larger percentage of successful cases than those in which the pain continued for a longer period, the ratio being 53 per cent to 30.

Some support is afforded the theory that maldevelopment of the pelvic organs may cause dysmenorrhœa. Twenty cases of the total series of 95 presented infantile pelvic organs. Treatment resulted successfully in but 25 per cent of these, while in cases in which the pelvic organs were fully developed and normal, 52 per cent presented a favorable result.

The results of the examination of the curettings do not support the theory that chronic endometritis is the cause of dysmenorrhœa. Microscopical examination was made of 61 curettings, 45 of which were found to be normal. Hypertrophy of the uterine glands was noted in 9 instances, while in one the endometrium was œdematous. Only 6 cases of chronic endometritis were noted in the 61 of the series.

Attempt was made to ascertain if a relationship existed between dysmenorrhœa and sterility in the series. The list comprised 26 women married for more than a year, who had never become pregnant. Three of the cases were among the pelvic inflammatory cases, and consequently were excluded, while two other cases failed to report as to any subsequent pregnancy. This leaves 21 cases in the series for consideration. Six of the 21 cases became pregnant subsequent to the operation, three cases in two, five, and two months, respectively, and the other three cases in one, two, and three years. It would appear that these latter cases should not be considered as due to the influence of the operation, and consequently that dilatation and curettage is not of great value in relieving sterility. The author calls attention to the fact that the possibility of sterility in the husband, as well as possible attempts to prevent pregnancy, must be borne in mind when considering these cases. It appears to the reviewer that this table is not of value, unless it can be definitely stated that the woman desires children and that the husband is potent.

Two of the six patients who became pregnant were not relieved of dysmenorrhœa, while 5 of the 15 who did not become pregnant were relieved by the operation; consequently the author concludes that the connection between dysmenorrhœa and sterility is accidental and of no importance.— *American Medicine*, vol. x, No. 19, Nov. 4, 1905.

F. W. LYNCH.

CÆSAREAN SECTION BECAUSE OF DYSTOCIA DUE TO ABNORMALITIES OF THE SOFT PARTS. By A. Garkisch.

Garkisch reports nine cases of Cæsarean section, two of which were undertaken because of abnormalities in the soft parts. In one case there was a uterus bicornis unicollis with the pregnancy in the left horn, while the right non-pregnant horn was retroflexed, forming a tumor the size of a man's fist incarcerated in the pelvis. This so completely obstructed the inlet of the pelvis that delivery per vias naturales was impossible. The second case was that of an advanced carcinoma of the cervix. This has been reported elsewhere. Still another case has come to his notice, in which the obstruction to the inlet of the pelvis was due to a large sarcoma of the deep inguinal lymph-glands.

In addition to the late establishment of menstruation, its irregularities, and painful character, other peculiarities have been observed in cases with bicornate uteri; namely, that the two halves may become pregnant alternately, and one case is reported in which abortion always followed pregnancy in one horn, while pregnancy in the opposite horn always went to term. Other peculiar conditions have been noted, and even though the pregnancy goes on smoothly, trouble always arises at or during labor; most frequently it progresses very slowly because of weak uterine contractions, which in itself, often, is the indication for operative interference; at other times the forces are insufficient to expel the placenta, and hemorrhage may result. The position of the fetus is always influenced by the shape of the interior of these uteri, and when the septum between the two horns is only partial, the fetus frequently assumes the transverse position.

He dwells on the importance of a diagnosis because of these possibilities. The non-gravid horn has been mistaken for an extrauterine pregnancy or a dermoid cyst. It has been said that when bicornate uteri are found, there is a marked increase in breadth of the pelvis, but in his case this was not so. In other cases reported, it has been found in generally contracted pelves. The fact that, usually, the tumor (non-pregnant horn), as palpated through the vagina, contracts synchronously with the pregnant horn is of assistance in establishing the diagnosis.— *Prager. Med. Wochenschrift*, Nos. 37, 38, 1905.

ABSTRACTS OF CURRENT LITERATURE

DEPARTMENT OF OBSTETRICS

UNDER THE CHARGE OF

C. S. BACON, M. D. RUDOLPH W. HOLMES, M. D.

C. v. BACHELLÉ, M. D.

PREGNANCY PAINS. Schatz, of Rostock.

Schatz, as early as 1870, studied the mechanical effects of uterine pains, and measured them by means of a colpeurynter placed in the uterus and connected with a dynamometer. By this instrument, which he called a toko-dynamometer, he was enabled to measure and record the force of the contractions of the uterine muscle during labor. The study of the anomalies of the pains is of much importance to mother, child and accoucheur. Schatz's labors and ideas concerning labor mechanics have obtained scanty recognition in societies and in text-books since their promulgation in 1874 and 1876. While his researches in the last century were chiefly upon the physiological mechanics of the labor machinery, they have lately led him to consideration of the central control of the nervous mechanism of the uterine contractions. He holds that there is a center in the medulla for exciting uterine contractions and also one for inhibiting them. The inhibitory center has periodic intervals of depression, corresponding, in a way, with the menstrual periodicity and, at these periods of depression during pregnancy, uterine contractions and sometimes subjective pains will be set up in a regular rhythm. The normal termination of pregnancy is at one of these periods of depression of the pain-inhibitory center and usually corresponds to the end of the tenth lunar month. Similar periods occur, though less markedly, throughout pregnancy, being especially noticeable towards the end of gestation.

The article deals with the so-called " bad pains," which are often taken for true labor pains, but which are usually typical periodical contractions of the latter part of pregnancy. The existence of these " pregnancy pains " is very little recognized by the profession.

So little is the natural history of the " bad pains " (" schlechten Wehen ") understood by the average obstetrician that the author considers it lucky for the average woman affected by these pains if she does not fall under the observation of some midwife or physician. The chances are great that the latter will mistake the character of the pains, and, believing them to be the true pains of labor and indicative of inertia of the uterus, will institute meddlesome and perhaps dangerous measures. The dangers to the mother from such impatience and ignorance on the part of the obstetrician are genuine and often great. As an illustration, Schatz cites a very interesting case, reported by Börner, of " weak pains " in an elderly primipara. Schatz relates several cases similar to that of Börner, except that no interference was instituted, where the results were less tragic. The pregnancy pains would begin several days before the estimated date of labor, but usually in a period half or a quarter as long as the menstrual type.

Often the pregnancy pains would encroach so closely upon the regular labor pains that it would be difficult to draw the line where the former ceased and the true pains of parturition began. The main point was, that, in most cases, the pregnancy pains were of much less intensity than the true labor pains. They were such as would by many have been diagnosed as " bad pains," " weak pains " or pains of inertia. In some cases there was more than one series of pregnancy pains, often with intervals of several free days between them.

Pains ensue spontaneously and in regular serial procession, not only at the time of expulsion of an ovum and to that end, but also during the pregnancy, and especially during the second half. The apparent uselessness of such contractions during pregnancy, or rather our ignorance of the use of such contractions, will not permit us to deny their existence.

Schatz estimates that ten per cent of women who have been long enough in the clinic to have the pregnancy observed exhibit marked pregnancy contractions. He holds that hemorrhages during pregnancy and eclampsia during pregnancy in most instances coincide in point of time with the

periodical pregnancy pains. This point is illustrated by several cases.

Schatz recognizes two general types of periodicity in pregnancy pains, the four-weekly and the six-weekly. In many women there occurs at least once after the beginning of pregnancy a sort of pregnancy menstruation, at least symptoms, including sometimes a slight show of blood, analogous to those of regular menstruation, although less marked. Such a pregnancy menstruation comes on usually four weeks after the last normal menstruation. In many women, however, this pregnancy menstruation appears—and often with regularity in successive pregnancies—six weeks subsequent to the last regular catamenial flow, rather than four weeks thereafter. In such women, also, the first menstruation after labor often occurs in six weeks instead of four weeks. Therefore he distinguishes the four-weekly type, with its fractions of two and one weekly periods, and the six-weekly type, with its fractions of three and one-and-one-half-weekly periods. In primiparæ these pregnancy pains are often only slightly felt and probably often not felt at all, although they serve to dilate the os to a considerable degree, and even to thin out the cervix.

The author quotes cases, in total to the number of one hundred and sixty, from his clinic in Rostock, illustrating both the whole periods and the fractional periods. There seems to be a tendency among women to follow in subsequent pregnancies the periodical type exhibited in their first. There have not been, however, enough observations to certainly determine this point.

During the last month of pregnancy the pains are always more frequent and more easily aroused. In other words, the nervous apparatus pertaining to the uterus is more susceptible to irritation at that time. If one notes the time from the beginning of one series of pains to the beginning of another period, as one would in speaking of menstruation, then one finds that the pain periods towards the end of pregnancy repeat themselves, always, however, by halving or quartering. Here, as in reckoning menstruation periods, the duration of the series of pains is not counted, only the beginning.

The question whether all pregnant women experience these pregnancy pains throughout gestation in a greater or less degree must probably be answered in the affirmative. The almost universal partial dilatation of the os and thinning of the upper part of the cervix, as well as the rapid entrance of the head into the pelvic inlet in primiparæ, prove their existence in the later months. The periodical hemorrhages in placenta prævia without subjective pains show the existence of periodical pains during the early months. Probably all pregnant women have pregnancy pains, regularly and periodically, although they seldom feel them acutely in a subjective sense. The frequency and severity of the painful periods towards the last of pregnancy seem especially liable in the neurasthenic.

Besides the regular periodical pains of pregnancy, there exist sometimes, although relatively rarely, series of pregnancy pains of irregular appearance, due to some local irritation, such as sudden changes in the position and posture of the woman, extra strong movements of the child, influence of cold or heat upon the abdomen, etc. Psychic, neurotic and bodily causes of irritation outside of the uterus may sometimes be the causes of such pains. Such irregular and non-periodical contractions must be considered as of a more or less pathological nature.

Fever may cause pregnancy pains, but usually only when it occurs at a time coincident with a period when the pain-inhibitory center is depressed, namely, one of the typical periods or fractional parts thereof, already mentioned.

It is not necessary that the pregnancy pains begin at exactly the typical period, any more than that menstruation begins exactly. Numerous cases are cited showing a postponement of the period one day or its advancement for a like space of time.

The diagnosis of pregnancy pains and the differentiation in individual instances from pains of true labor is of extreme importance but, unfortunately, not easy. The subjective pain of the contractions of pregnancy is scarcely different from that of the contractions of labor, especially the beginning of labor. The ordinary contractions which are usual throughout pregnancy and which normally increase towards the end of gestation, will become more painful subjectively, and even more painful than the regular labor pains in cases of rheumatism of the uterus, neuralgic conditions, painful scars from former labors or operations, inflammatory lesions in the pelvic peritoneum or disease of the sacral or lumbar vertebræ. While the frequency of the pregnancy pains is usually less than that of labor, yet exceptions are so numerous that little reliance can be placed upon this circumstance in point of diagnosis. The duration of single pains is commonly less in the pregnancy pains than in labor. The duration depends upon the contractile energy of the uterine musculature, and this is less in pregnancy than at term.

The efficiency of the contractions offers the

best mark of differentiation between the two classes of pains. Those of pregnancy, owing to the less complete preparation of the tissues, are much less effectual than are those of labor, although in other respects they appear similar. Dilatation of the cervix and other soft parts does not take place so readily. The secretion of mucus is less. Mixture of blood with the mucus is seldom noted in the case of the pregnancy pains. Rupture of the membranes is less likely to ensue after a considerable duration of pregnancy pains than after a similar duration of those of labor. On the other hand, both dilatation of the os and loosening of the waters may occur quite early in the progress of pregnancy pains and true labor not ensue for several days or weeks. The most characteristic feature of pregnancy pains is the apparently uncaused cessation thereof. In twelve or twenty-four hours the pains diminish and cease, as if the uterus had become exhausted. Now, in well-developed women it is known that such exhaustion or inertia of the uterus very rarely comes on within so short a time and without much stronger pains and pains which have met with great obstruction.

The most important diagnostic mark of pregnancy pains is their time of onset. When pains begin earlier than the estimated term and when this estimation is supported by good evidence, and if other ground for such beginning can be ruled out, the probability remains that one has to deal with pregnancy pains instead of those of a premature labor or a labor inaccurately estimated. The farther ahead of the estimated time of term, the more probable is the diagnosis. Another point in the differentiation between pregnancy pains and those of labor is found in the administration of a dose or two of quinine. This will not affect the periodical pains of pregnancy, nor will it start pains *de novo*, but will usually regulate poor pains of labor by increasing their strength and frequency.

Other therapeutic measures may influence the course and character of the pains. Change of posture from the dorsal to the semiprone causes a distinct diminution in frequency of pains, both those of pregnancy and those of the dilatation stage of normal labor. Return to the dorsal posture again increases the frequency of the pains in both instances. The probable cause of this phenomenon is the reduction of irritation of the ganglia at the cervix and upper vagina as the weight of the uterus is removed. In later stages of labor, such change of posture affects the pains very little. Rupture of the membranes usually forces the labor, provided it occurs during a period of depression of the pain-inhibitory center. If it occurs during pregnancy, at a time when pains are absent, it is by no means always followed by contractions, often not until the next depression period. Even then the labor does not necessarily follow. Schatz considers hydrastis without effect in stimulating pains even during labor.

If a probable diagnosis of pregnancy pains is made, it is recommended to use morphine or codeine to diminish the contractions both in strength and frequency as a means of preventing possible premature supervention of true labor Chloroform or chloral should only be employed when eclampsia threatens. If there is reason to desire a premature emptying of the uterus, it is well to select as the time for artificial interference one of the periods of the pregnancy pains. This can be estimated by calculating the expected term of pregnancy and carefully observing for the pregnancy contractions at some period before that event is due, such as four, two or one week before the estimated term.

When the pains begin so near the calculated end of pregnancy that one is in doubt whether they are of the pregnancy variety or are true labor pains, it is well to give a dose of quinine (gr. 0.25), repeated in two hours. If the pains are those of labor, the quinine will probably increase and accelerate them, while if the pains are the periodical ones of pregnancy, no effect will be observed. If the latter appear to be the case, one should then administer morphine and put the patient to bed, as much as possible in the semiprone posture.

The chief practical conclusion to be drawn is, that the obstetrician should remain calm, should be willing to await developments and should impress upon the patient and upon her surroundings a corresponding calm. Above all, he should not allow himself to be betrayed into undertaking any operative measures or other means of hastening the conclusion of labor because he may think he is confronted with "poor pains" or inertia of the uterus. Patience should be the watchword. The symptoms are manifestations of normal phenomena. Strenuous measures are decidedly out of place. They are followed not seldom by hemorrhages or detachments of the placenta, and impatience is severely punished. Of course, true indications here, as elsewhere in obstetrics, should be met by the proper measures, therapeutic or or operative, but nothing should be done of a radical nature unless valid indications are present. HENRY F. LEWIS. — *Die Deutsche Klinik*, ix, p. 281.

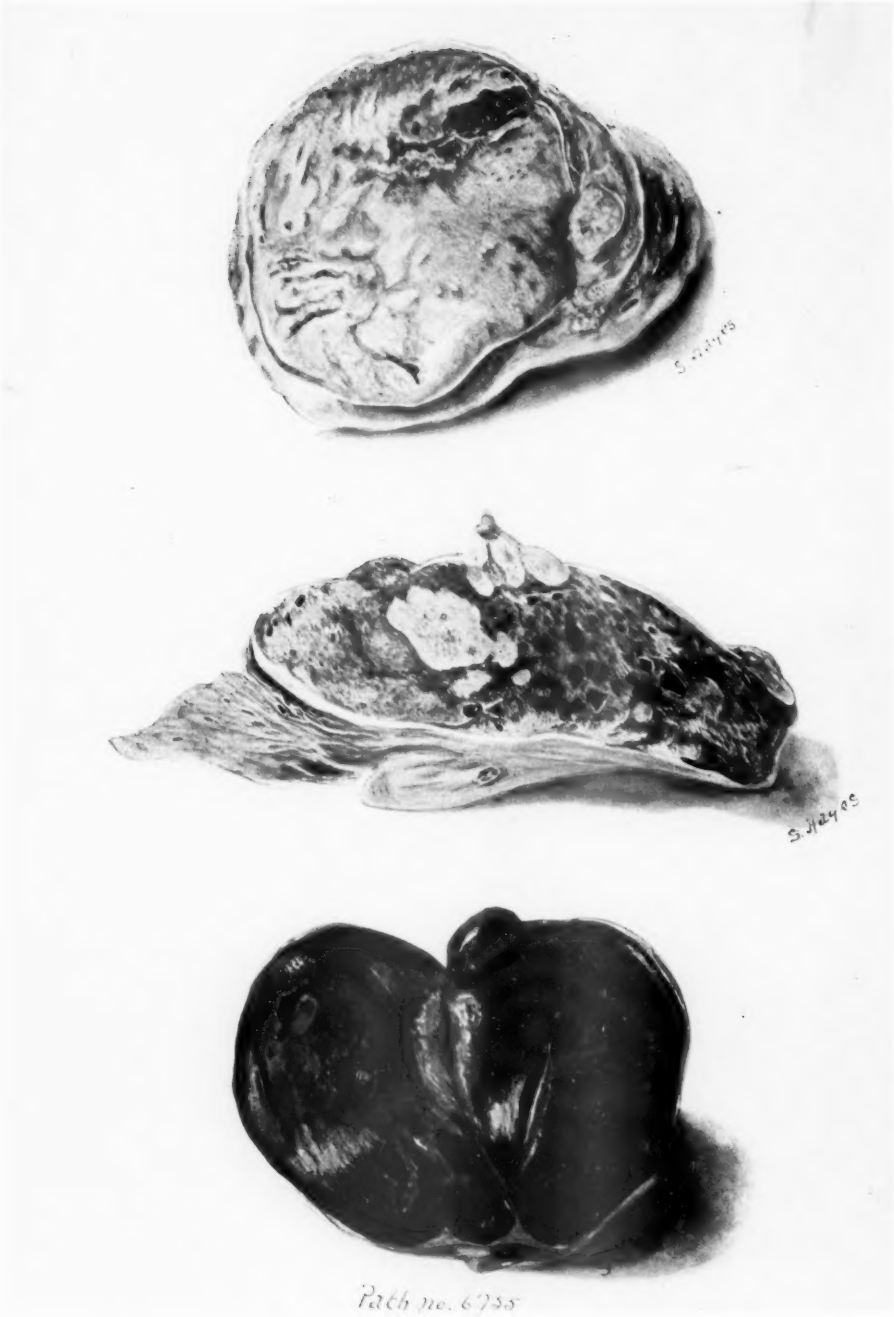


PLATE I. Top picture, Fig. 34, is a painting from a Kaiserling specimen taken from case 14. Colloid adenoma with area of hemorrhage.

Second picture, Fig. 40, is a painting from Kaiserling specimen removed from case 17. Mixed adenoma.

Bottom picture, Fig. 47, is a painting of a fresh specimen taken from case 19. Mixed adenoma, hemorrhagic type.